AMERICAN DYESTUFF REPORTER

SAMPLE SWATCH QUARTERLY

"Circulated Everywhere Dyestuffs Are Used"

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Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

NEW YORK, APRIL 4, 1927

A Silk Thread Dyehouse

Machine Twist—The Apparatus and Its Construction—Special Features for Efficiency—Advantages of Partitions—Shade Requirements

By E. W. ROBINSON

Superintendent Belding Heminway Company

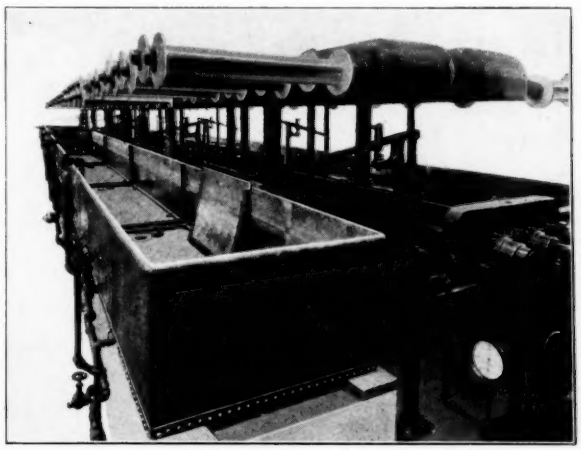
PRACTICALLY all of the articles on silk dyeing which have appeared in the REPORTER have had to do with the dyeing of silk for fabrics either in the skein or in the piece, whereas our dyehouse is concerned entirely with the dyeing of silk threads used in sewing or stitching.

The principal or largest class is termed machine twist. Machine twist is a thread made by first doubling the proper number of raw threads, depending on the size of finished thread desired, and giving them a fairly hard spin. After spinning, three strands are doubled together and twisted in the opposite direction from that of the spin, giving within two or three turns to the inch the same as that put in in the spinning operation. Then we eliminate the tendency to kink and snarl by wet stretching. After reeling into the proper sized skeins, it is ready for dyeing. The tightness of the twist complicates the dyeing operations as it is more difficult to secure a complete boil-off, rinse and, last but not least, a thorough penetration of the dyestuff. We boil off in batches of 160 pounds, using a boiling-off or degumming liquor made up of a first quality olive oil soap. This operation requires about two hours, and is followed by a thorough rinsing, starting with warm water.

APPARATUS EMPLOYED

Up to four years ago we did our dyeing entirely by hand, turning the silk on either maple or bamboo sticks. This was a slow job and required a considerable amount of time and labor and gave us, many times, colors that were uneven. The past four years we have used an imported skein dyeing machine which consists of a series of porcelain rollers which are carried on arms that project over the dye tubs located on both sides of the machines. These rolls are about 30 inches in length with a barrel approximately three inches square. The flanged ends are nearly 9 inches in diameter. Since installing our machine, a roll made of Monel metal has been constructed which is better than porcelain, being cheaper and less liable to break. The rollers are set in the hoisting units in numbers ranging from 1 to 10 rollers in a unit or section. Each unit is geared up so that the rollers are always in right relation to each other and do not interfere. Each unit when lowered engages in a worm gear on the drive shafts which run the entire length of the machine. The shafts run 120 r.p.m. and the rollers make 12 r.p.m., and reverse their direction every six turns. This insures a constant movement of the silk in the dye bath, and also a change of direction every thirty seconds.

The power required to operate the machine to full capacity is one 5 h.p. motor The hoisting mechanism consists of a small pump driven from one end of the



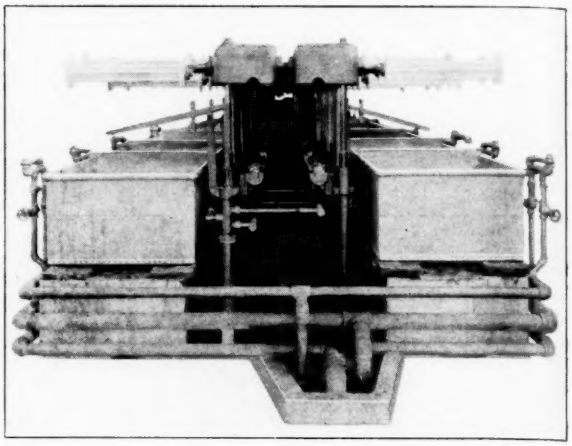
Skein Machine and Dye Tanks, Showing Partitions

shaft which forces water into a cylinder or accumulator whose piston is weighted with 4,500 pounds of iron. This pressure is distributed to the piston upon which the various units are suspended. All that is necessary to raise a section or unit is to push down a level which operates a valve allowing the water in the accumulator to go into the cylinder and thus force up the piston which supports the rollers.

Features That Save Time

Our machine has units made up of 1, 2, 3, 5 and 10 rollers. The Monel metal dye tubs for the 1, 2 and 3 roller units are separate or individual, but the tubs for the 5 and 10 roller units are constructed as one long tub with removable partitions for each unit so that by removing the partitions we are able to dye as one bath with not only 10 roller units but 15, 20, 25, and so on up to forty. We frequently have 5 and 10 pound lots which are dyed on the 2 and 3 roller units, but the usual run on staple colors is from 30 to 60 pounds with possibly 120 pounds for the best selling colors. With all of the partitions in place we are able to dye twenty shades at the same time, as our equipment consists of two 1 roller, one 2 roller, two 3 rollers, two 5 rollers and three 10 roller units on each side, or 100 rollers altogether.

It has been our experience that since using this machine we have secured a better penetration and more level dyeings, as all of the silk is moving constantly. The dyed material winds better, makes less waste, and consequently gives us a finished material with fewer knots, which is a very important factor in sewing silks. The dye tubs are shallow and require only about half the boil-off liquor that was formerly used by the old dye tubs. This is a decided help, for in this age of jazz colors when black is so little used, a sufficient supply of gum soap is a real problem.



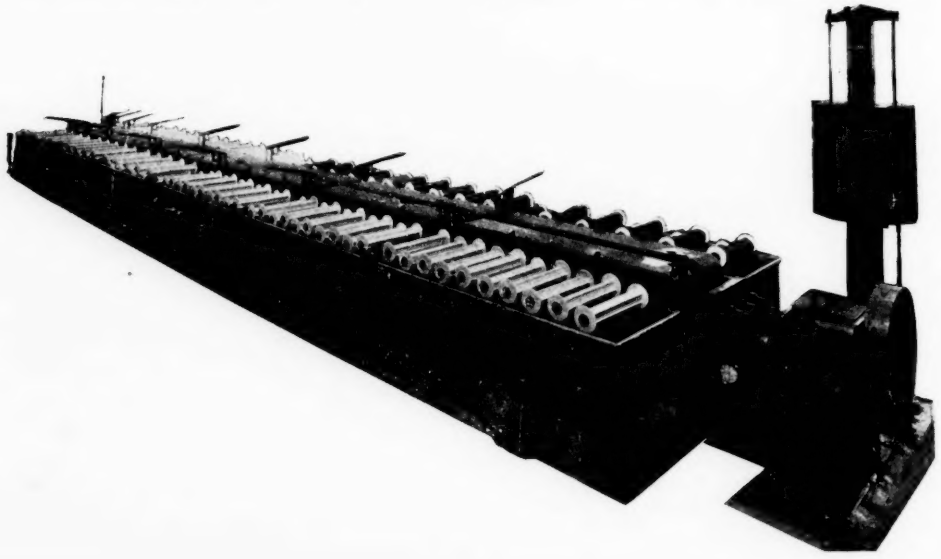
End View Showing Piping Arrangement

Finally we must consider the saving in labor cost, as but half the regular number of men are needed; in fact, we have had instances where one laborer has been doing the work that formerly required eight, and doing it better.

To further simplify the operation of the machine we have piped to each tub with boil-off liquor regular water and steam. The larger or 10-roller tubs have two water and boil-off liquor supply inlets which halves the time required to fill those tubs.

Advantages of Partitions

We will confess that we were a bit skeptical as to the advisability of using removable partitions, but after we saw one job dyer bleaching cotton yarn with a chlorine bleach in one 10-roller unit and in the other side of the partition dye rayon with a light Rhodamine shade, our objection to partitions was eliminated and



View of Large Skein Dyeing Machine and Dye Tubs

now we are convinced that the removable partitions are essential to a full and economical utilization of the machine, especially in this time where a dyer has such a varied quantity in his dye lots.

We dye from 450 to 500 different shades, some a straight acid color, others diazotized and developed. Some wash threads are colored with an alum mordant. Darker colors have a chloride of chrome bottom. Once in a while the requirements are such as to call for vat colors. One of our big problems has been the change in cast of many colors under artificial light. Every reader will appreciate the cry that would rise when under artificial light milady's dress appeared to be stitched with a silk at least fifteen shades too red and under sunlight the gown appeared O. K. This is a real problem for the dyer, and one has to know his dyestuffs from every angle in order to give matches that stay matched.

COLLINS & AIKMAN ACQUIRE A. T. BAKER

Collins & Aikman Company, makers of Ca-Vel velvets, have announced the acquisition of A. T. Baker & Co., Inc., who manufacture velours for furniture, draperies and motor cars. Combined capitalization of the two companies approximates $15,000,000. The acquisition was brought about without additional financing. Practically no changes in management are contemplated; A. T. Baker, Jr., remaining as chairman of the board of the subsidiary bearing his name, and his former place as president being taken by Melville G. Curtis, president of Collins & Aikman Company.

Through this acquisition the two mills of A. T. Baker & Co., in Philadelphia, and Baker Mills, North Carolina, will be operated in conjunction with the three Collins & Aikman mills in Philadelphia. Numerous economies and increased production are expected to result from the consolidation.

Both companies have long histories in the textile industry. Both of them, also, have prospered during recent years from the demand for velvets and velours created by home-building activities and by the popularity of closed automobiles.

Collins & Aikman Company was established in 1845, and A. T. Baker & Co., Inc., was founded thirty years ago. With a combined pay roll of more than 3,000 persons, the consolidated companies will continue to manufacture pile fabrics of every available raw material, including cotton, ramie, linen, mohair, worsted, rayon and silk.

Ralph Dunford, president of the National Association of Woolen and Worsted Overseers, has become associated with the Laurel Soap Manufacturing Company, Philadelphia. Mr. Dunford will have his headquarters in Providence and will cover the New England territory for them from this city.

REMOVAL OF NIGROSINE STAINS FROM HOSIERY AND OTHER FABRICS

Use of Benzaldehyde Found Most Practical by Research Associate

NIGROSINE is used for making black shoe polish, hair dyes and various types of ink. As a result light-colored hosiery is frequently spotted with Nigrosine.

In the past much difficulty has been encountered in removing stains from Nigrosine from hosiery and other garments and fabrics. It has been one of the problems which the dry cleaners have not been able to solve.

Quite recently Moses H. Goldman, Research Associate of the National Association of Dyers and Cleaners, working in the laboratories of the Bureau of Standards, has found that the organic chemical benzaldehyde, if properly used, is quite effective in the removal of stains, which are fundamentally due to the presence of Nigrosine. The method of procedure is as follows:

PROCEDURE

Spot the stain with benzaldehyde, following this treatment with 5 per cent ammonia, meanwhile gently rubbing the spot. A single treatment is sometimes all that is required, but a second, and in some cases a third application of the benzaldehyde followed by ammonia may be necessary before the spot is completely removed. The spot to which the treatment is applied is finally sponged with dilute alcohol to remove any excess of benzaldehyde that may be present, and also to avoid leaving a ring on the fabric. By this treatment stains are removed without any loss of the original color of the fabric.

This method is now being used practically and successfully in the dry-cleaners' industry, and may at times prove of interest and value to the hosiery manufacturers.

AT THE KNITTING ARTS EXHIBITION

Oakite Products

Samples of material which have been wet-finished with Oakite, such as silk, cotton, wool and various rayon mixtures, will be displayed at the booth of the Oakite Products, Inc., at the Kniting Arts Exhibition being held this week in Commercial Museum, Philadelphia. Representatives from the technical department of the company and a number of field service men will be in attendance during the show to discuss finishing problems with textile men.

Papers of the Dye Division of American Chemical Society

To Be Presented at the Society's Spring Meeting in Richmond, Va., April 11-15.

THE program of the Dye Division of the American Chemical Society will represent one of the most interesting and important activities of the society's spring meeting, which will be held next week in Richmond, Va.

As the South's great textile centers are but a short distance from Richmond, the committee that arranged the Dye Division's program made a special effort to include a number of papers on the application of dyes, as well as some on the science of their manufacture and properties. The division has thus endeavored to interest the technical mill men of the South in this meeting and as a result many of the papers scheduled should be extremely valuable contributions to the literature of dyes and dyeing. Abstracts of these papers are given below. It will be noted that the authors are in most every case among the leading authorities in this branch of science.

Color and Constitution. II. Influence of Position Isomerism in the Naphthalene Azo Beta Naphthol Series. M. L. Crossley.—In continuation of the work previously reported on color and constitution a study has been made of the influence of the position of substituents in the molecule on the color in the naphthalene azo beta naphthol series. Several substituents have been considered and their influence on both the naphthol and naphthalene rings shown. The effect of the conjugated ring is very pronounced, and the dyes of this series produce deeper colors than the corresponding benzene azo series. The effect of the sulphonic acid group in the beta naphthol portion of the molecule is similar to that manifested in the benzene azo beta naphthol series. The effect of changes in the nature of the substituent is also demonstrated.

The History and Development of the Anthraquinone Acridones. Robert J. Goodrich.—Starting with the simplest anthraquinone, benzacridone, the development of the more complicated and substituted anthraquinone acridones is briefly traced, especial emphasis being placed on the history of development as indicated by the patent literature. The four general methods of synthesis are briefly mentioned. Certain relationships of their constitution to their tinctorial properties are brought out.

The Olefine Derivatives. A New Influence in Synthetic Organic Chemistry. G. O. Curme, Jr., and J. G. Davidson.—The paper points out existence of commercial source of new aliphatic organic chemicals from olefines which promise to influence future developments in dyestuff chemistry. In previous times, existence of supplies of first benzol and coal-tar aromatics, later methyl alcohol and wood products chemicals, more recently acetylene derivatives, have profoundly influenced trend of dyestuff chemistry. Products described and type of reactions to which suited are indicated.

Chemical Control in the Dyestuffs Industry. John H. Sachs.—After the definition of "chemical control," the paper is divided into three parts, namely:

1. Control on materials going into a process.
2. Control during process.
3. Control on the products of the process.

General observations along the lines of the three above subjects are made and specific examples are cited. The whole argument of the paper can be summarized as follows: Success in the operation of a chemical process is directly proportional to the understanding of the nature of materials going into the process, the nature of the reactions involved, and the uses to which the product of the process will be applied.

Methylene Blue Hydrates. A. A. Ticknor.—The stable crystalline hydrate of zinc-free Methylene Blue is reported in the literature to contain three molecules of water of crystallization.* There appears to be no evidence of the existence of other definite hydrates.

The Fusion of Aryl-Amino-Anthraquinones and Dianthraquinonylamines with Aluminum Chloride. O. M. Bishop, R. N. Lulek and P. E. Thomaschewksi. The anthraquinone compounds resulting from the condensation of chlor-anthraquinones with organic amines, particularly the amino-anthraquinones, when fused with aluminum chloride, are changed in their chemical structure and the resulting fusion products show a marked improvement over the original condensation products in their dye properties. The condensation products so treated have yielded a large number of vat colors of desirable properties, varying in shade from yellow to brown. The discussion of the various types includes a number of new vat colors not previously described in the literature.

Influence of Domestic Patent Law on Invention in Organic Chemistry. Lieut.-Col. J. B. McMullen.—Inventions in organic chemistry in their relation to patent law. Importance of the specification of chemical patents as distinguished from the claims of such patents. What constitutes invention in the field of organic chemistry? Patent may cover process, product and apparatus, together or separately. Progress of invention in organic chemistry in the United States in the past thirty years, native and alien.

The Preparation of Vital Neutral Red. Max Phillips.—Neutral Red suitable for vital staining is

(*Continued on page* 230)

*The requirements of the U. S. Pharmacopoea are based on the assumption that the hydrate containing $3H_2O$ exists. A study of the hydration of Methylene Blue has shown that the stable hydrate contains five molecules of water of crystallization. (Ticknor-Methylene Blue Hydrates.)

Proceedings of the American Association of Textile Chemists and Colorists

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FEBRUARY MEETING OF NEW YORK SECTION

The regular February meeting of the New York Section of the American Association of Textile Chemists and Colorists convened Friday evening, February 25, 1927, at the Elmwood Country Club, North Paterson, N. J., Herbert Grandage, Chairman of the Section, presiding. More than one hundred were present.

When the routine business of the Section had been transacted the speaker of the evening was introduced.

Chairman Grandage—Our speaker to-night will be Mr. Harry Price, of the American Cellulose & Chemical Manufacturing Company, who will present a paper entitled "Dyeing of Celanese Brand Yarns and Fabrics," which has been prepared by Mr. C. G. Candlish, Chief Colorist of British Celanese, Ltd. For the benefit of those here to-night who haven't received the notice of this meeting (which, of course, includes all of our guests) we want you to know that Mr. Price will be well able to answer any questions that you care to ask him, after he has presented the paper.

Mr. Price! (Applause.)

Harry Price—Mr. Chairman, Members of the Association: As I look around here and see such men as Mr. Milne, Dr. Dengler, Mr. Lotte, Mr. McCollum and a number of others who have undoubtedly seen considerably more Celanese dyed than I have, I am somewhat dubious as to whether I will be able to answer all the questions that you may care to ask afterwards. I think some of those men are much better fitted to answer them than I am. However, I will do everything I can in that line.

At the time the possibility of reading a paper before this meeting was first suggested to me, I had just received from England a paper which had been prepared by Mr. Candlish, the Chief Colorist of the British Celanese, and read by him before the Society of Dyers and Colourists at Bradford, which was the most interesting and comprehensive article on the dyeing and manipulation of Celanese that I have seen. I thought that I could do no better than read that paper, with certain modifications to meet conditions in this country. I know that Mr. Candlish would have been glad to address you, himself, but unfortunately the Atlantic Ocean intervenes.

. . . Mr. Price then presented his prepared paper, illustrating by the use of samples:

Dyeing of Celanese Brand Yarns and Fabrics

By Harry Price
American Cellulose & Chemical Manufacturing Company

Celanese, although the most recent of textile fibers, has now been upon the market for some little time, and undoubtedly its properties and advantages are well known to the majority of you present this evening. For the benefit of the few who, however, have not as yet come into close contact with it, I must, at the risk of being a little tedious, pass briefly over its main properties and the salient points of its manipulation.

Celanese, unlike other types of so-called artificial silks,

is not a form of regenerated cellulose, but is composed of cellulose acetate, and it is owing to this difference in chemical composition that it varies so much from other artificial fibers in its peculiar and valuable properties. It should not be regarded merely as a substitute for natural silk. Rather should it be looked upon as a distinctive textile fiber of extraordinary usefulness and decorative value. It can be used alone, giving a 100 per cent Celanese fabric of absolutely distinctive qualities of appearance and handle; or, used in conjunction with other textiles, rayon, cotton, wool or natural silk, it may be made to yield effects, wonderful in their variety, which cannot be achieved by the use of any other fiber.

I propose to deal first of all with Celanese when used alone, and later when used in conjunction with each of the other textiles, indicating the proper manipulation in each case. As previously remarked, Celanese is composed of cellulose acetate, and as such is acidic in nature; consequently it is very easily attacked by alkalies, especially caustic alkalies, being hydrolized to form regenerated cellulose, this change entailing the loss of its peculiar and distinctive qualities. Therefore, as it is extremely desirable that these qualities should be maintained, it is important to insure that caustic alkalies should be excluded from all processes through which it passes. Ammonia should be regarded as the safe alkali to use, although soda ash up to 2 per cent on the weight of the Celanese can be employed under careful supervision. It should be noted also that if Celanese be wet-processed at temperatures above 80 deg. Cent., it is liable to lose its luster, and therefore if it is desired to keep the luster unimpaired this temperature should not be exceeded except under the special conditions mentioned later in this paper. If due regard is paid to these points Celanese can be handled with as much facility as any other fiber.

At this point it may be remarked that the phenomenon of delustering, which formerly was regarded as a disadvantage, now shows itself to be a distinct asset, and one, moreover, which is peculiar to Celanese. The tendency in recent years has been to dispense with crude colorings and brilliant surfaces in favor of softer tones and subdued luster. This influence has made itself felt in textiles, and to-day there is a distinct demand for fabrics possessing the handle of real silk which are at the same time of subdued luster. This demand can be and is being satisfied by means of fabrics, composed wholly or in part of Celanese, in which the Celanese component has been delustered. The process is extremely simple and effective. Hot water alone at, say, 90 deg. Cent. will achieve this result, the length of time depending upon the degree of luster required and on the type of machine used.

In machines such as the Winch, where the fabric is almost wholly immersed, delustering takes place very much more quickly than, for instance, in the jig, where it is only exposed to the action of the hot water for a very short time. At Cumberland we use what we call a "submerged jig," in which the fabric is wholly immersed. The process can be hastened by raising the temperature to the boil or by the use of a solution of olive oil soap and Turkey Red oil, which reduces the surface tension of the liquor. By this means any desired degree of luster can be obtained, from the merest trace of cloudiness to a dead white opacity. These samples of all-Celanese fabrics and Celanese combined with other fibers show very interesting effects, the subdued luster being attained by raising the temperature during the dyeing operation. In two-fiber work the more brilliant should be dyed a bright shade of medium depth or less. In this way the luster of both fibers is used to the best advantage. If the colorings are reversed and the more brilliant fiber dyed the heavier shade, the distinction is lost and the result becomes rather insipid. So much for delustered fabrics.

Turning now to the question of unimpaired luster, I will deal very briefly with the broad outlines of dyeing. The methods are explained in detail in the dyeing leaflets published by the American Cellulose & Chemical Manufacturing Company, Ltd., copies of which I have here and which will be available for distribution at the close of the paper.

Since Celanese in the gray contains very few impurities beyond a little lubricating oil and possibly surface dirt, it requires very little scouring. A safe and useful scour consists of 1 to 2 grams per liter of a good alkali-free soap and 1 to 3 c.c. per liter strong ammonia at 75 deg. Cent. for about forty-five minutes. If the fabric is oily from the loom or knitting machine, it is advantageous to add 2 to 5 c.c. per liter of Celascour, a valuable scouring agent produced by the American Cellulose & Chemical Manufacturing Company, Ltd., for use with their products.

A warning note might be sounded here concerning the use of scouring agents marketed primarily for assisting the scouring of cotton or the other textile fibers. While some of these assistants are harmless when applied to Celanese, others unfortunately are not so, and serious losses might appear through the injudicious choice of the scouring agent. Celascour is free from this objection and may be used without fear of damage either to Celanese or to any other fiber.

After scouring, if it is desired to bleach the goods this may be accomplished by the use of ¼ deg. Tw. sodium hypochlorite, either neutralized or made very slightly acid with dilute acetic acid. A shorter method consists of adding about 3 c.c. per liter of a strong hypochlorite solution, which is generally about 50 deg. Tw., to the soap bath, previously cooled to 50 deg. Cent. In this case care should be taken that the sodium hypochlorite solution is

not too strongly alkaline. It is often put upon the market containing considerable quantities of free caustic soda to preserve stability, but it should be noted that the combined action of hypochlorite and caustic soda greatly enhances the tendency to saponify the Celanese. Sodium hypochlorite can be produced containing not more than 3 per cent free alkali, and this amount should be specified when ordering.

After bleaching, the goods should be well washed off, and if an acid bleach has been given it is desirable to follow it with an antichlor treatment of 1 gram per liter sodium bisulphite cold fifteen minutes.

For the dyeing of Celanese the SRA colors of the American Cellulose & Chemical Manufacturing Company, Ltd., are now so widely known and their use so universal that only a brief description of them will be given here. They comprise a chain of dyestuffs ranging in shade from a lemon yellow through orange, red, violet and blue to black. They are all of good fastness to washing, light, perspiration and other agencies, and some of them compare favorably in this respect with the best vat dyestuffs; but of this I will treat later. They are all intermiscible, and therefore can be used in combination to give any required shade. They are extremely easy of application and are characterized by their excellent leveling properties; so much so that stripiness, that bugbear of the dyer, is reduced to a minimum. It is generally admitted that Celanese dyed with SRA colors gives far less trouble in this respect than any other so-called artificial silk.

A full description of the method of application is given in Celanese Dyeing Leaflet No. 2, Third Edition. Recent additions to the range, not included in the leaflet, consist of SRA Golden Yellow X, SRA Golden Orange III, SRA Orange III, SRA Red VII, and a new yellow, SRA Golden Yellow XI, and a new blue, SRA Blue VII, will shortly be put upon the market. SRA Blue VII will enable dyers to obtain heavy shades of blue and green with better fastness properties than can be obtained at the moment.

These dyestuffs are marketed in the form of pastes, and all that is required to dissolve them is hot soapy water, which should be poured slowly on the paste with vigorous stirring. After sieving, the solutions are ready to be added to the dye bath. The making up of the latter depends to some extent on the nature of the goods to be dyed. The best assistants for the SRA colors are olive oil soap, Turkey Red oil and Celascour; and where the material is closely woven or contains highly twisted yarns, the addition of ½ to 1 gram per liter soap or 1 to 2 grams of Turkey Red oil or Celascour is advantageous in wetting out and assisting penetration. These assistants may be mixed with the dyestuff paste prior to the solution, or may be added directly to the bath before the colors.

The temperature of the bath should be 80 deg. Cent., and the goods entered and this temperature maintained throughout the dyeing operation. Where it is extremely difficult to obtain penetration, the goods may be entered cold and the temperature gradually raised to 80 deg. Cent.; but it is only very rarely that this pre-action need be taken. "Salting-on" agents, such as common salt and Glauber salt, have very little effect on the depths obtained from SRA colors and their use is unnecessary for these colors, as excellent exhaustion of the bath is obtained without them. The various forms of Celanese and the methods of manipulation call for some slight attention at this point.

Yarns

Dyed yarns are still used to some little extent for knitting or weaving colored effects, although, as explained later, it is much more advantageous to manufacture in the greige and subsequently to cross-dye.

Yarn is dyed preferably in hank form, either by hand or by machine. Either method is suitable, and the question is simply one of economical working. If dyed by hand, the two-stick method, in which the hanks are turned by the sticks, is preferred to the single-stick method, where the hanks are turned by hand. An oil emulsion finish greatly assists the subsequent winding operation.

Knitted fabrics composed entirely of Celanese have achieved great popularity for underwear, ladies' dresses, etc., because of their soft, silkly touch and excellent draping qualities. Not quite so well known but of equal importance are two other properties they possess. The first is that they are excellent insulators of heat, and for this reason their use for underwear is to be strongly recommended. The second, still more important from a health point of view, is that they allow ultra-violet rays to pass through them practically unhindered. Celanese very easily takes precedence over any other textile fiber in this respect. A further point to be noted, and one which may prove rather useful, is that the delustering of Celanese appears to have comparatively little effect on the passage of the ultra-violet rays through it. A very strongly delustered piece, almost completely opaque, showed very little more resistance than the ordinary lustrous fabric. Ultra-violet rays are now coming into prominence in therapeutic treatments.

For this purpose the garment worn by the patient should be as fine as possible and should allow the optimum passage of the rays. The capacity of Celanese fabrics produced by delustering gives a much greater covering power with the same thickness of fabric and casts off very little more of the health-giving rays, and should, therefore, prove of great importance to the violet-ray clinics.

Returning to the manipulation of knitted fabric, the best type of dyeing machine to use is the reel or winch.

The pieces, preferably of about equal length, are sown end to end so as to form a number of separate strings of fabric. An addition of Celascour to the dye bath is helpful in reducing any tendency toward overdyeing where creases may have formed.

The manufacture of all-Celanese woven goods has increased enormously in the last year or so, and dyers are liable at any time to be called upon to process them. Fabrics of excellent draping qualities are produced, possessing a softness of texture and richness of appearance unobtainable in any other fiber except real silk. Their uses are very varied, but some indication is given by the type of fabric. Satins, twills, failles, taffetas, morocains, crepe-de-Chines, velvets and voiles are all being produced in considerable quantity and, to my mind, indicate that manufacturers are making a real effort to meet the public taste in this direction. Given judicious handling, these fabrics are not difficult to process.

It is very desirable that they should be kept in the full open width and free from creases right from the loom to the finished goods. Creases which are pressed in previously to dyeing or allowed to form during dyeing are very difficult to remove, and almost invariably result in overdyed streaks. A thorough scour should be given. The use of Turkey Red oil or Celascour is very beneficial and it is often advantageous to pad the goods through the oil and leave batched for some time—say, over night—before dyeing. This process helps in level dyeing, swells the fiber, prepares it for the dyestuff and gives a firmer fabric. The type of machine used varies for the fabric. For satins, taffetas, etc., the pig is undoubtedly the best. They should be run with as little tension as possible and, if possible, the draw rollers should be fitted with ball or roller bearings. Copper or Monel-metal linings are preferable to iron or wood. For crepe fabrics, tension should be eliminated. Altogether the most suitable machine is one where the fabric is wound on to a frame and wholly immersed in the liquor, such as machines generally used for dyeing velvets. An open-width hydro-extractor of the centrifuge type can be used for plain fabrics, but crepes should be hydro-extracted by a machine of the suction type. All woven fabrics should be dried on the stenter; the steam-heated cylinders tend to produce a glazed appearance, which is undesirable and cannot be removed except by reprocessing.

Mixtures of Celanese with Other Fabrics

I will now pass to the consideration of Celanese when used in conjunction with other textile fibers. A considerable quantity of Celanese has been used with cotton. Cotton is a dull, lifeless fiber of very great utility but little beauty, although modern developments in finishing have greatly increased its attractiveness. Celanese made an immediate appeal to manufacturers making cotton fabrics, chiefly because of the great possibilities lying in cross-dyed effects. This effect is, no doubt, well known to most of you, but the point is so important that you will perhaps forgive me if I stress it once more.

Early in the history of Celanese dyeing it became evident that dyestuffs which dyed cotton had little or no affinity for Celanese and, conversely, colors which dyed Celanese did not stain cotton appreciably. The same phenomenon, to a slightly lesser extent, holds good for wool and real silk, and immediately there arose, by a judicious choice of dyestuffs, great possibilities of achieving cross-dyed effects from the one dye bath. The advantage of this to the manufacturer is obvious. Instead of keeping his capital locked up in stocks of dyed yarn, he could weave his fabric from Celanese and cotton and send the cloth to the dyers to be cross-dyed in the shades fashionable at the moment. Thus he reduced his dyed stock to a minimum and ran no risk of having goods left on his hands—or the merchants' hands—for which there was no sale because of fashion changes.

Other advantages accruing from the use of Celanese are now realized and appreciated. The softness of the yarn gives a much softer handle to the fabric than in the case of other artificial silks, together with better draping qualities, while the regularity of the yarn reduces to a minimum the unsightly stripiness of weft when the spools are changed. As mentioned earlier, if the Celanese be delustered the cotton should be dyed the fuller, sadder shade, while the Celanese should be lighter and brighter in color. By adopting this procedure a lively, sparkling fabric is produced.

Cotton Colors

Turning to the manipulation of cotton-Celanese goods in the dyehouse, the first point requiring attention is the scour. A useful scour is given by 2 grams per liter soap, 3 c.c. per liter ammonia or 2 per cent soda ash on the weight of the goods, 3 to 5 c.c. per liter Celascour at 80 deg. Cent. until sufficiently scoured.

Various classes of cotton colors may be employed, the type chosen depending on the degree of fastness required. Broadly speaking, there are four classes of cotton colors which may be used for dyeing cotton in the presence of Celanese. These are: Direct cotton colors; basic colors; sulphur colors; vat colors.

The first class is generally employed where the fastness demands are not too stringent, although even here modern research has led to the compilation of a range of colors of remarkably good fastness to light. Many of these direct cotton colors show a perfect resist against Celanese and are widely used for that purpose in dyeing mixed fabrics. A very comprehensive list of these dyestuffs is given in our supplement No. 1 to Celanese Dyeing Leaflet

No. 2. It should be noted that not all direct cotton colors resist Celanese perfectly, and even different deliveries of the same color vary at times in this property. Therefore, to eliminate all risks each delivery should be tested out prior to use in the dyehouse. The dye bath is made up with the requisite cotton and SRA colors, the goods entered at 80 deg. Cent. and dyeing continued to shade. Although salting-on agents have little effect on SRA colors, their use may be necessitated to get full value from cotton dyestuffs, and amounts up to 20 per cent of the weight of the goods may be employed, added preferably in portions. Beyond 20 per cent it is not safe to go, as there would be a tendency to precipitate the SRA colors.

For pale shades a little soap or Turkey Red oil may be added to the bath at the beginning and the entering temperature reduced to 60 deg. Cent., gradually raised as exhaustion proceeds. After having matched to shade, the goods are washed off in the usual manner.

The second class of cotton dyestuffs—the basic colors—are used only where maximum brightness is required on the cotton component, and their employment is deprecated except for this special purpose. The procedure is to dye the Celanese first with SRA colors, wash off, then tan the cotton in the usual way and dye with the basic colors in the cold, using a considerably higher concentration of acetic acid in the bath than is normally used in cotton dyeing.

Sulphur Colors

The modern demands for shades that will withstand successfully either repeated washings in the domestic washers or the more drastic treatment accorded by successive visits to the laundry has made itself felt with regard to all types of fabrics. Dyed materials composed partly of Celanese and partly of cotton have been included in this demand. The ordinary range of SRA colors produces shades that are quite fast enough for this purpose when applied to the Celanese component, but trouble has been experienced with the cotton colors. The dyestuffs which would normally be used for fast-to-washing shades on cotton are the sulphur colors, but hitherto there has been no safe and satisfactory method for applying them in the presence of Celanese, as the considerable amounts of sodium sulphide considered to be necessary in the dyeing processes would have had an injurious effect on Celanese and caused a certain amount of saponification and consequent staining of this fiber.

Recent research, however, has shown that the amount of sodium sulphide can be reduced very materially, and that when the following method is used cotton can be dyed with sulphur colors quite satisfactorily in the presence of Celanese. As in the case of direct cotton colors, individual colors have to be chosen which have the property of leaving Celanese unstained. We have compiled a list of between thirty-five and forty sulphur colors of American manufacture which have this property and which will be included in the sulphur dyeing leaflet, which will be ready for distribution in the near future. The method of solution of the sulphur colors is as follows:

For every 3 parts of dyestuffs (100 per cent powder) are required 2 parts of rock sodium sulphide or 4 parts of crystalline sodium sulphide, 2 parts of sodium hydrosulphite and sufficient Celascour to give a concentration in the dye bath of from 1 to 10 c.c. per liter. The color is wetted-out with a small amount of Celascour, a sufficient amount of water is added and then the sodium sulphide; the temperature is brought up to about 90 deg. Cent., and when the sulphide is dissolved the sodium hydrosulphite is dredged in and the liquor stirred gently until the color is all dissolved. The bath is set with the remainder of the Celascour and the dyestuff solution filtered in.

If this method is adhered to the bath should remain in good condition throughout the dyeing. If the bath shows signs of precipitation at any time, further slight quantities of hydrosulphite and Celascour can be made, but it is neither expedient nor necessary to make additions of sulphide. The goods should be entered at 50 deg. Cent., temperature raised to 75 deg. Cent. in fifteen minutes and dyeing maintained at this temperature for one hour or to shade. Finally, they should be rinsed in hot water and soaped well with 2.5 grams per liter of olive oil soap at 60 deg. Cent. This method gives excellent results, free from rubbing and bronziness, and will be found quite as satisfactory as the older method with larger quantities of sulphide. The concentration of Celascour in the bath varies with the individual colors used and with the depth of shade required.

I mentioned a concentration of 1 to 10 c.c. per liter, but this covers the widest range likely to be used. Actually, many of the dyestuffs require only 1 to 2 c.c. per liter, and it is not only unnecessary but undesirable to exceed the optimum quantity. The resist to the Celanese is not further improved, and the excess of Celascour only tends to reduce the yield of color on the cotton. As a rough guide it may be stated that 10 c.c. per liter should be necessary only in the case of very heavy shades and blacks. Salt may be used in the dye bath in quantities up to 10 per cent of the weight of the goods, but caution should be exercised in making this addition, as in certain cases it tends to throw the color on the Celanese and impair the result. If the Celanese component required dyeing, this should

be done in a fresh bath, using the SRA colors which are most fast to washing.

Vat Colors

Synchronizing with the call for fast-to-washing shades there has arisen the modern demand for fast-to-light colors which is every day growing more insistent. To enable dyers of fabrics composed of Celanese and either cotton, rayon, wool or natural silk, to satisfy the needs of their customers in this respect, our dyeing department has evolved not only a range of fast-to-light SRA colors, but also a method by which the fastest cotton colors can be successfully applied to the alternative fiber in the presence of Celanese.

As is well known the fastest cotton colors both to light and washing are found in that range of dyestuffs known as vat colors, and more particularly in the anthraquinone type of vat colors. Unfortunately, the application of these colors requires a considerable quantity of alkali, and as alkalies, in general, are injurious to Celanese, until recently it has not been possible to permit their employment in its presence. Now, however, this disadvantage has been overcome and the dyer has at his command a method with which he can meet the most rigorous demands of his customers.

Briefly, the problem was to find a substance which, while possessing sufficient alkalinity to enable the leuco compound of the vat color to pass into solution, had little or no saponifying action on Celanese. Such substances have been found in the sodium salts of the phenols, cresols, naphthols, etc., and for economical reasons the one which finds most application is sodium phenolate. This salt has very little tendency to saponify Celanese, and yet by its aid a great number of the vat colors can be successfully dyed on the cotton.

As in the case of direct and sulphur colors, however, only selected vat dyestuffs should be used. Quite an extensive range is presented in our dyeing leaflet No. 5, but it should be noted that, as yet, all the vat dyestuffs have not been tested out for this purpose, and consequently if a dyer has a particular preference for color or colors not listed, he should not assume that that color is not applicable by this method. It is simpler and more expedient if the sodium phenolate is bought as such than if it were made in the dyehouse from phenol and caustic soda. A stock vat may be made or the color may be vatted in the dye bath itself. Both are covered in our dyeing leaflet No. 5. Temperature of the bath varies with the colors chosen as in ordinary vat dyeing, but as a rule will be about 40 to 45 deg. Cent.

Sodium phenolate does not readily attack Celanese even at 50 or 70 deg. Cent., but no useful purpose is served by exceeding 50 deg. Cent. After dyeing the goods are squeezed, oxidized and rinsed in water containing a little hydrosulphite just as in the ordinary method. If the Celanese is to be left white, the goods should be soaped at 60 deg. Cent. with about 2 grams per liter soap, as a hot soaping hastens the oxidation of the color and develops its full depth and at the same time it removes any superfluous colors mechanically held on the surface of the Celanese. If the Celanese is to be dyed, a previous soaping is unnecessary, since the SRA colors are applied from a soap bath. The fast-to-light series of the SRA range consists of nine colors, shading from a bright golden yellow through red, violet, blue to black, thus enabling practically any desired shade to be matched. They are distinguished from the remainder of the SRA colors by the prefix of an asterisk and are referred to as SRA starred Golden Yellow X, etc. Some of the starred colors are equal in light fastness to the best anthraquinone colors, while all of them are of such fastness that they are in daily use for guaranteed fast-to-light materials. Their method of application is exactly the same as that for the other SRA colors, and they may be used if desired in conjunction with these colors.

Mention must be made of the new type of vat color marketed by the Scottish Dyes, Ltd., known as Soledon Colors and by the Newport Chemical Company, known as Solanthrenes. So far only a small range of these colors are available, the latter company having produced, I think, three colors, namely:

Solanthrene Bright Purple 2R
Solanthrene Yellow G
Solanthrene Jade Green

But, undoubtedly, additions will be made. These are water-soluble salts of the leuco compounds of dyestuffs of the anthraquinone types produced in a stable form. They are valuable in that they need no vatting and are dyed on to cotton as a direct color, afterwards being oxidized by means of sodium nitrite and sulphuric acid or sodium bichromate and sulphuric acid. They stain Celanese only slightly or not at all. When dyed on cotton in the presence of Celanese, no variation from the normal method of procedure need be made. But it should be noted that if acid is used to exhaust the bath the Celanese is stained rather more deeply than if it were not used.

Wool-Celanese and Silk-Celanese Mixtures

Turning to mixtures of Celanese with the animal fibers, another wide field of possibilities opens out.

The combination of wool with Celanese for underwear seems almost an ideal one. The elasticity and softness of the wool are fully retained and the addition of the Celanese lends a liveliness and sparkle to the fabric as a whole, very pleasing in appearance and quite unobtainable by the use of wool alone. Further, and this is a very important consideration, the warm and cozy touch to the skin is fully maintained. Although cross-dyed effects in underwear are not commonly made, yet the speckled appearance produced by dyeing the one fiber in pale shades while the other is left white, are increasingly becoming the vogue. In this case the better effect is obtained by dyeing the wool with a color which resists the Celanese as the purer white, and the brilliant luster of the latter show up to advantage. Colored lingerie—not always in pale shades—is now fashionable, and shot effects in woolen underwear, so long as they are not bizarre, might make a distinct appeal.

A knitting yarn which has not been exploited quite as fully as it might be is obtained by doubling wool, cotton and Celanese together. The first for warmth and softness, the second for economy, and the third for luster and liveliness. By suitable choice of colors, three distinct shades can be dyed, and the resulting fabric is excellent from points of view of comfort, durability and appearance.

Wherever an all-silk fabric is made Celanese can with advantage replace some portion of it. Satins, crepe de Chines, marocains, brocades, failles, etc., all lend themselves very readily, and, in addition, new and hitherto unobtainable results can be produced. The manufacture of silk-Celanese goods is rapidly increasing, proving in an unmistakable manner the adaptability of both men and machines. Celanese is slightly more lustrous than natural silk and figured designs produced by the former show up well on the duller sheen of the silk, particularly when cross-dyed.

The handle and draping qualities of the combination of these two fibers are excellent in every respect. The pleasing folds into which such a fabric naturally falls seem to catch the rays of light and reflect them in all directions, and when shot effects are introduced cause ripples of colors. As explained earlier, the fact that Celanese can be delustered to any desired degree can be made use of here to produce very attractive results. A crepe de Chine or marocain, in which the Celanese has been delustered so that it is slightly less lustrous than the silk and which is then dyed a solid shade, possesses a softness and richness of appearance not to be obtained by any other means. Care should be taken to achieve just the right degree of delustering. If not taken far enough the full beauty is lost. If taken too far, the surface becomes opaque and loses its bloom.

There are undoubtedly great possibilities in this process. With regard to the dyeing of the animal fibers in conjunction with Celanese, recent research has given great scope to the dyer. Real silk may be degummed safely in the presence of Celanese without delustering the Celanese by one of the three processes given in our dyeing leaflet No. 5, or by the following method:

Treated for one hour at 90 to 95 deg. Cent. in a solution of 30 grams per liter borax and 2.5 grams per liter soap in a bath of about 40:1 volume ratio and then treated in a 40:1 bath with 2.5 per liter soap for one hour at 80 deg. Cent., wash off and dry.

Woolen Mixtures

In the case of woolen mixtures, scour in a bath containing 2.5 grams per liter olive oil soap, 2-5 c.c. per liter Celascour and 1-3 c.c. per liter 20 per cent ammonia made up to 40:1 volume ratio with soft water, temperature should be 75 to 80 deg. Cent. and the duration about forty-five minutes or as long as is necessary to achieve the desired result. If it is required to bleach the wool or real silk, this can be accomplished in the ordinary way by using hydrogen peroxide, which has no harmful effects on Celanese.

The principal colors used for dyeing wool and silk are the acid colors, and as many of them show perfect resist qualities against Celanese, they may be used to great advantage both in resist and two-color effects. Briefly, the method is a two-bath, cross-dyeing process in which the Celanese is dyed first and natural fiber afterwards. This order is adopted because the SRA colors stand the acid cross-dyeing much better than the acid colors stand the cross-dyeing from a soap or Turkey Red oil bath. It should be noted here that wool is stained more deeply by the SRA colors than is cotton or rayon, and real silk occupies a position in between cotton and wool.

Different varieties of silk differ somewhat in the degree of resist they offer. The Celanese component is dyed in the usual manner with SRA dyestuffs, thoroughly washed off to insure that no soap is left in the fiber, and then the material is entered into the acid bath and preferably given a short passage through the acid liquor before any dyestuff is added. Either a mineral or organic acid may be used, but formic acid is especially recommended. When the goods are thoroughly impregnated with the acid liquor, the necessary quantities of dyestuffs and Glauber salt are added, and the dyeing carried out at a temperature of 75 to 80 deg. Cent.

Advantage can often be taken of the protection

given by solutions of salts when dyeing with acid colors which do not readily level out. For example, 10 grams per liter of ammonium sulphate will protect Celanese when dyed at the boil for the length of time required to level out the acid colors used for the animal fibers. In such cases the amount of formic acid should be slightly reduced and it is desirable not to use mineral acids at all.

Cotton Colors

When fastness to washing is the chief desire, the direct colors are often used both on wool and real silk. Selected dyestuffs have, of course, to be employed, because not all the cotton colors have affinity for these fibers, and further selections must be made of those colors which do not stain Celanese. The dyestuffs may be applied from the same bath as the SRA colors as if dyeing cotton, but, as is well known, the direct colors draw much better on to the animal fibers if applied from a slightly acid bath rather than from a neutral or mildly alkaline one. The choice rests with the dyer and it is simply a question as to whether the better yield of color from the acid bath recompenses for the extra cost of the cross-dyeing processes.

Vat Colors

So far the anthraquinone vat colors have met with very limited application to wool or silk on account of the injurious effect of the caustic alkali employed. The vat colors used for these fibers have been of the indigoid type, and this class is not now regarded as absolutely suitable for work of the highest fastness. Various attempts to use the anthraquinone type have met with little success, but the processes patented by our company for the application of anthraquinone vat colors to cotton in the presence of Celanese is also applicable to the dyeing of wool and silk with a far greater margin of safety than has yet been assured. The process is essentially the same as that given for the dyeing of Celanese cotton goods.

As previously mentioned, the Soledon colors of the Scottish Dyes, Ltd., and the Solanthrene colors of the Newport Chemical Company need no vatting and no alkali, and consequently they can be applied to both wool and silk without any fear of injury. Dyeing is carried out with the addition of Glauber salt or common salt, and exhaustion may be further improved with acid, although this involves a tendency to stain the Celanese.

Oxidation is effected as before with nitrous acid, chromic acid, ferric chloride, sodium persulphate or perborate. When the wool or silk component has been dyed either by the sodium phenolate method or with Soledon or Solanthrene colors, the Celanese portion is dyed to the required shade in the usual manner with the SRA starred colors.

In conclusion I wish to state that the services of the dyeing department of the American Cellulose & Chemical Manufacturing Company, Ltd., are always available for those who desire to make use of them for any purposes whatsoever connected with the dyeing of Celanese.

If you have any questions to ask at this time I will be very glad to answer them if it is in my power to do so.

Discussion

Chairman Grandage—Mr. Price stands ready to answer any questions you care to ask, with the modification which he added himself, of course.

Mr. Scott—May I ask what chemical constituents make up Celascour?

Mr. Price—If I am not mistaken, that same question was asked at one of your meetings about two years ago. Unfortunately, I am not at liberty to say just what it is made of.

Mr. Scott—Is it acid or alkali?

Mr. Price—It is neutral.

Mr. Scott—That answers my question.

Walter Haas—I notice that on your delustered Celanese you have been able to return the luster of the printed form. Would you care to explain that?

Mr. Price—On the printed Celanese, do you mean?

Mr. Haas—Yes.

Mr. Price—They deluster the fabric first, and then print it with a paste made up of sulphocyanide, water and gum arabic. The entire formula I cannot give you. I have purposely left out printing, as it is quite a lengthy subject in itself. There are a number of concerns who have done and are doing considerable printing, both similis and plain, on Celanese.

George L. Baxter—I have heard that some firms are successfully mercerizing Celanese. Do you know anything about that, or can you tell us anything about it?

Mr. Price—Some concerns are mercerizing fabrics containing Celanese and there is a process which has been patented—a caustic soda method, I believe—which we will be glad to send you if you care to write in for it.

Mr. Frey—May I ask if Celanese can be weighted, and, if so, how? (Laughter and applause.)

Mr. Price—Celanese is being weighted by at least one concern here in Paterson. (Laughter.) Frankly, I cannot say whether the formula for weighting is available for distribution or not. I do not think it is.

Mr. Van Vechten—How heavily?

Mr. Price—I know it has been weighted up to about

25 per cent. How much it can go above that I do not know.

Mr. Frey—May I ask what is a good black for Celanese and silk mixtures; that is, what makes a good shade of black when you dye the Celanese and silk the same shade?

A. P. Howes—You had a sample here to-night.

Mr. Price—I believe that in that sample they used Chlorazol Black LF and SRA Black IV, the Black IV for the Celanese and the other for the silk.

Chairman Grandage—Are there any further questions, gentlemen?

H. F. Herrmann—Mr. Price, I should like to ask a few questions—the delustering process seems very interesting. I could not help but express a little admiration for the sample that I have here. In the accidental delustering of artificial silk we have usually noticed a more or less complete destruction of the character of the fiber, a sort of strawy appearance, and I was wondering whether, in the attempt to deluster a complete piece, you do not run the risk of destroying the piece in the grain of the piece itself or possibly of shrinking it or doing something to it that might reduce its value.

Mr. Price—There is no risk present unless there is an amount of alkali. Just boiling will not harm the fabric at all.

Mr. Herrmann—There is no shrinking?

Mr. Price—It will simply delusterize. If there is sufficient alkali present it will not only delusterize but will saponify. Then the chemical constitution will be turned back to regenerated cellulose.

Mr. Herrmann—I have particular reference to a delustering that might occur in a neutral silk bath. The yarn loses its twist and the silk assumes what I can best describe as a strawy appearance.

Mr. Price—We have boiled the Celanese free from alkali for almost a week without destroying the fabric, without harming it whatsoever.

Mr. Herrmann—The other question I want to ask is with reference to wool and silk. You say that the wool can be dyed level and the shade dyed without boiling by the addition of a certain amount of ammonium sulphate. I am a little dubious as to the ability of the dyer to really penetrate a fairly heavy material without boiling and to keep its shade under control unless he boils.

Mr. Price—With the ammonium sulphate he can boil. The ammonium sulphate protects the fabric and he can boil.

Mr. Herrmann—That is the point I want to make clear. You claim the ammonium sulphate acts as a protective agent. In the use of chrome or alizarine colors for really heavy men's wear where boiling is essential, and where the boiling operation would probably stretch out over four or five hours, say, in the preliminary dyeing, and then in the top chroming, have you had any experience in the application of Celanese for that work?

Mr. Price—It is used very little in that way.

Mr. Herrmann—Do you believe it could be used in that way?

Mr. Price—Its application up to the present time with wool has been largely for striping.

Mr. Herrmann—I mean in striping of men's wear, where the stripes should be preserved at their utmost luster and yet the quality of the fabric is such that you must use the very finest colors available and you must penetrate.

Mr. Price—I doubt if you can dye for more than an hour or so and retain the luster.

Mr. Herrmann—You have had no experience with that?

Mr. Price—No; but I think one hour is about your limit.

Mr. Herrmann—Another question as to the possible survival of Celanese in repeated hot pressings, steam pressings, etc., of men's wear or ladies' wear under the hot iron in conjunction with wool which is pressed, say, in a men's suit every week or every few days, will the silk gradually lose its luster? Will it disintegrate under that repeated pressing?

Mr. Price—I do not think the pressing would delusterize. Celanese has a melting point, and if an iron is sufficiently heated it will melt the Celanese; but figures that have been given to us by the Bureau of Standards in Washington specify that the safety point in ironing Celanese is about 30 deg. higher than that of real silk or wool.

Mr. Herrmann—Then, the ordinary, customary treatment that the tailor gives to men's suits would not in any way destroy or injure the Celanese stripes?

Mr. Price—No.

Mr. Herrmann—I had particular reference to the hot iron and blowing on of live steam.

Mr. Price—We advocate the use of a warm iron in all ironing; not a hot iron.

Mr. Herrmann—That answers my question.

Walter Haas—I should like to ask another question: Where you have a mixture of Celanese and silk and you want to preserve the luster of the Celanese, how would you degum the silk?

Mr. Price—There are three processes mentioned in one of the dyeing leaflets and I read to you another one using borax. The third process, which is the one most used, is as follows: "Make up a 30:1 bath with soft water containing 10 grams of olive oil soap per liter. Add 1.5 per cent sodium phenolate on the weight of the goods. Treat for two hours at 80 to 85 deg. Cent. Rinse well in hot water." Here is the one which uses borax: "Treat for one hour at 90 to 95 deg. Cent. in a solution of 30 grams per liter borax and 2.5 grams per liter soap in a bath of

about 40:1 volume ratio, and then treat in a 40:1 bath with 2.5 grams per liter soap for one hour at 80 deg. Cent. Wash off and dry."

Adam A. Hellmuth—Can Celanese be printed with Indigosol by the steaming process?

Mr. Price—That I cannot answer, I am sorry.

. . . The meeting adjourned after a rising vote of thanks to the speaker.

The Relation of Chemistry to the Textile Industry*

By A. A. Cook
United States Testing Company

The value of chemistry and chemists in industry is a subject receiving considerable attention in recent years. There is now little question in most industries that chemistry, particularly chemical research, has not only saved industry from economic failure, but has produced in the long run dividends which were previously inconceivable.

No less an authority than A. D. Little, the consulting chemist of Cambridge, Mass., has described the role of chemistry to industries analogous to the "writing on the wall," as described in the biblical story of Belshazzar's feast. Like Belshazzar, the industry failing to utilize chemical research will be weighed in the balance and found wanting.

Take one instance where an industry in this country to-day is on the down grade due to this very factor, or more accurately, due to this line of activity on the part of other interests. The industry referred to is the wood distillation industry, which has been the source of wood alcohol, acetone and acetic acid for many years. In the last few years research has brought forth cheaper methods for production of acetone by bacterial fermentation. Furthermore, it has shown how the acetic group (acetic acid) may be synthesized from acetylene. Lastly, and what promises to be the greatest blow, is the synthetic production of methanol (wood alcohol) from carbon monoxide and water by German chemists. The cost of this latter process is so small, comparatively, that there is no question but that it must supersede the distillation process.

A field for chemical research which is at present receiving marked attention is the petroleum industry, particularly as regards motor gasoline. It has been stated by competent authorities that at the present rate of consumption, the natural supply now in sight will last only about twenty years. At present the practical aspect of this situation in motor gasoline goes only so far as to the addition to the gasoline of certain preparations which are said to bring about complete combustion by catalytic effect. One of them is the much-discussed tetra-ethyl lead. There are indications that other more ambitious steps are in progress, such as the production of gasoline directly from bituminous coal. There are many other examples of the saving effect and the earning power of chemical research which might be cited in industries of such divergent character as paper, leather, paint, ceramics, steel, etc.

Textile Industry

How about the textile industry's use of chemistry and research? Unfortunately the record is comparatively meager thus far in this country. The two notable examples, namely, (1) dyestuffs, and (2) the synthetic fiber called "rayon," owe their development almost entirely to European chemists. There is no question that the wonderful development of the knowledge of dyestuffs has been due primarily to German chemists. That the dyestuff chemists in this country have made meritorious progress since 1916 is, of course, of great credit. The research underlying the development of rayon was accomplished by French and English chemists previous to 1900. Although this country can take no credit for initiating the various processes of rayon manufacture, it may look with considerable pride to its accomplishments in quantity production. The reflection of this remarkable result of chemical research upon other branches of the textile industry, is noteworthy. For example, the cotton industry, which is in a serious condition, particularly in New England, may perhaps be compelled to admit a few years hence that rayon, through its use in cotton fabrics, helped to save the industry. In general, however, the textile industry, founded as it has been on the method of trial and error, is one of the last with a few notable exceptions to take advantage of modern science.

Compare the textile industry with the steel industry to-day, and we have a difference so vast that it can scarcely be comprehended. Thirty years ago the manufacturer of steel was a hit or miss proposition. It was difficult to produce steel of exactly the same quality by what was apparently the same process. Then gradually occurred the detailed study of the raw materials entering into the manufacture of steel, with a corresponding study of the changes produced during the manufacturing operations. In this study it is needless to say that chemistry and chemists play

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a most important part. So to-day the steel industry knows the scientific "why" of its operations, and as a result can by careful chemical control produce a lot of steel of exactly the properties desired, and, furthermore, can produce it now, six months or six years from now with exactly the same composition and properties. Certain processes in steel manufacture are absolutely dependent on a chemical test or analysis being made before the operation is completed.

Future Progress

In the textile industry there is no question that in mechanical lines, in the intricacy and performance of the machines, great advances have been and are being made all the time. But in respect to the intelligent understanding and control involving chemical treatments, as well as a thorough knowledge of the raw materials, there is a great deal lacking. There is little question that the application of chemical analysis to the problems of this industry will produce marked changes for the better. At the present time it may be said there is an ever-increasing tendency to apply chemistry to the industry, but only to a limited extent.

The future of chemistry and chemists as applied to the textile industry offers great possibilities if given the chance. First of all there must be a general enlightenment throughout the entire textile trade on all materials entering into the various manufacturing operations. This will not only create intelligent interest but also tend to raise the standards of the industry. Inferior goods will not be acceptable when jobbers and retailers know that there is no real excuse for them. This knowledge will compel the manufacturer to watch his processes more carefully, and to study the raw materials he is using. To do this will require a fundamental study into the details of the various processes as well as a careful control by analysis of his raw materials and products.

Consulting Laboratories

Lacking to a large extent the inside control and detailed chemical knowledge of the materials and processes involved in the textile operations, the industry is relying largely on consulting laboratories or testing houses. Such laboratories or organizations serve, in spite of considerable adverse criticism from the industry itself, many useful functions, not only in the control of materials but in the stimulation of interest in scientific methods. The amount of fundamental research in textile lines is extremely meager, and will be until manufacturers are enabled to see its advantages.

The United States Testing Company, the organization with which the speaker is connected, occupies a conspicuous position in this respect in the industry. The company is the outgrowth of the first public silk conditioning house in the United States (1880) and was recognized by the Silk Association of America in 1906 as the official authority in silk testing. Since 1920 the work of the company has broadened to a marked extent and now includes besides the recognized conditioning house tests such as conditioning, boil-off, scouring, sizing, winding and strength tests, all tests analyses relating not only to yarns and fabrics, but also to all kinds of mill supplies, including fuel, water, oil, soap, finishing materials, etc. Researches on a small scale are often undertaken in connection with some mill problems. There are, doubtless, many laboratories and organizations which are doing similar work in connection with the advancement of the cause of science in the textile industry.

Objects of Testing

The objects of such tests as conditioning, boil-off, and scouring are, of course, very obvious. The manufacturer desires for the sake of his own pocketbook to know exactly how much actual fiber he is buying, whether it is silk, wool, or rayon. He does not care to pay for water, silk gum, wool grease, or oil, the price of an equal weight of fiber. Also, the quality tests, including sizing, strength, elasticity, winding, inspection mirrors, etc., are obviously desirable to the manufacturer who is striving to put on the market high quality material as free as possible from the more obvious defects.

Referring back to the question of oil, particularly in silk and rayon yarns, there are a number of points of interest. There is a decided tendency to load up these yarns (particularly rayon) with excessive amounts of oil. Certainly 15 to 20 per cent of oil, as has been found in many cases, is not necessary for lubricating purposes. Yarn containing such quantities of oil actually drips with it, staining everything that it touches. Here arises the question of just what constitutes the necessary amount of oil for the various yarns. This depends not only on the type of yarn, but also on the nature of the oil used. Much data and research would be necessary to determine this with any degree of scientific accuracy. But it may be said that for most purposes not over 5 per cent of oil can perform any real function in the manufacturing processes.

The quantity of oil may be determined not only by scouring or boil-off tests, but also by a more technical method, i. e., extraction by means of solvents. Considerable work has been carried on at our laboratory

in regard to the most suitable solvent to be used, both from the standpoint of complete extraction and from the standpoint of ease of manipulation. For the past three years we have used a very light benzine (40 to 60 degrees) almost entirely. This solvent removes all traces of oil or fatty matter, but does not dissolve to any extent natural waxes, such as are present in wool or worsted tops and yarns. In this case the extraction is comparable to a thorough scouring, since it removes only the added oil. In the case of silk thrown yarns, it is advantageous in that it does not attack the silk gum to any extent. The matter of buying yarns such as rayon and combination yarns (as well as thrown silk and wool) on a guaranteed minimum oil content, is carried out only to a limited extent at present and deserves more attention by dealers and manufacturers who desire to conduct their businesses on modern scientific principles.

Quality of Oil

In regard to the subject of oil on yarns, there is another matter which has received considerable attention in recent years. This is a question of quality rather than quantity and concerns the nature of the oil used, referring particularly to the use of oils of petrolic origin commonly referred to as mineral oils. There is no question, perhaps in view of the very extended use of these oils, that they have advantageous properties, particularly in aiding penetration and lubrication. The matter of the satisfactory removal of such oils previous to the dyeing and finishing operations is the point which the speaker has particularly in mind. From the chemical nature of such oils, as contrasted with oils of vegetable and animal origin (hydrocarbons vs. fatty glycerides), there is found to be a vast difference in the way in which these two classes of oils react to soap or other scouring agents. The latter class is rendered soluble or becomes saponified by such action, while the former class must be removed mechanically, unaided by any chemical change. The speaker, therefore, maintains that in the case of the mineral oils, there may be certain difficulties encountered which affect deleteriously the dyeing and finishing of the material. In other words, they are not considered absolutely safe and foolproof, as are the saponifiable oils alone. On the other hand, however, it has been shown in several instances that oils consisting chiefly of petroleum products may be removed satisfactorily by careful scouring, particularly on unmixed rayon yarns. These, however, were oils especially prepared for this use. On mixed yarns and goods such as silk-rayon and wool-rayon, the possibilities of trouble are markedly increased, due in one case to the tendency of scum formation because of coagulation of the mineral oil with the silk gum, and in the other to the greater absorbtive nature of wool with the attendant dangers of too severe a scouring. It has been stated by a man who is considered an expert on thrown silk that although he used unknowingly for many years a mixture of mineral and neatsfoot oil in the soaking of raw silk, and as far as was known experienced no great amount of trouble due to the presence of the mineral oil, yet he would on general principles not advise its use.

That the question of the use of mineral oil on various kinds of yarns and material has two sides, is readily admitted by anybody of common intelligence. However, in the present state of the industry as regards scientific or technical control it is considered safe to avoid its use in most cases.

Many interesting examples along the line of mineral oil mixtures come up in the laboratory. One very extreme example recently came to the speaker's attention. It was marked "wool oil" and contained 95 per cent of mineral oil and 5 per cent of lanolin or wool grease.

Soaking Problems

The question of oil on thrown silk leads us directly into other problems regarding the soaking of raw silk. This is a matter of primary importance to the silk industry, in that many subsequent operations may be affected one way or another by the ingredients used in the soaking bath. In so far as the speaker's experience has shown, this is very largely a "hit or miss" proposition, and there is very little co-ordinated knowledge on the subject. There are many factors of importance in this operation, but the speaker can only mention a few of the more obvious points.

The simple matter of the water employed is, for example, of considerable importance. It is fairly evident that a water of nearly zero hardness and free from iron and organic impurities is essential to any soaking operation. In a number of cases investigated recently mills were found to be using hard water or water otherwise unsuitable for this operation.

The alkalinity of the bath is a question on which there is yet little data but which is one of the very important considerations in this operation and one which largely influences the silk in subsequent phases of manufacture. Besides the soap which forms the basis of most soaking emulsions, there is a tendency to use appreciable amounts of stronger alkalies, soda ash, and potash for example, which help to give a very desirable effect in obtaining a soft, hygroscopic thread which is so eagerly sought, particularly for the knit-

ting of hosiery. It is true that to a limited extent the addition of such alkali in small amounts adds to the stability of the emulsion and assists perhaps in the absorption of a maximum amount of oil by the silk. The amount necessary to produce these desirable conditions varies with the nature of the silk as well as the composition of the soaking bath. When, however, certain limits of alkalinity are exceeded, several undesirable factors may occur. One of the most obvious, perhaps, is that the gum may be so very softened that it has a marked tendency to strip. Another is the possibility of injury to the silk by the concentration of the alkali remaining from the soaking bath. This type of damage usually occurs as weak spots, and is sometimes not noticed until the silk has been stored for relatively long periods. It has been noted from laboratory analyses that thrown silk which has been soaked in a mildly alkaline bath picks up little or no soap from the solution. With increasing amounts of free alkali, the tendency to take up soap as well as the free alkali itself is accelerated to an extent far beyond what would be naturally expected by a simple proportion.

Sulphonated Oils

Another matter of great interest at the present time is the tendency to substitute emulsifying agents other than soap for the latter in whole or in part in the soaking bath. The speaker has particular reference to the so-called sulphonated or soluble oils. As is well known, these products are made by the action of sulphuric acid on castor oil or in some cases on other oils or fats, the resulting product being partially neutralized by caustic soda or ammonia. In general, the product made using castor oil as a base is recognized as a fairly stable compound on account of the nature of its principal fatty acid (ricinoleic). In the case of other stocks, not so much is known as to the properties of the sulphonated derivatives, and there is reason to believe that they may not be particularly stable in character. No general statement can be made as regards the use of the sulphonated fatty compounds in the soaking of raw silk until accurate data are available. Until such a time a degree of caution must attend their use.

Solvent Soaps

In the matter of soaps for scouring wool, rayon and other yarns, there is a marked tendency to employ volatile solvents incorporated in the soap. In general, this tendency is rather beneficial, and it doubtless saves time and temperature in the scouring operation. It is markedly advantageous to the fiber or the material itself to avoid long exposure and high temperatures in scouring. Several products of this type examined recently have contained as solvents carbon tetrachloride, chloroform, trichlor-ethylene, turpentine, pine oil, etc., in proportion varying from 5 up to 30 per cent. When the matter of such high boiling solvents, such as pine oil, is to be considered, there are raised some doubts as to the eventual effects on the material.

Special Problems

There are many types of investigations which a consulting laboratory meets in the course of its business. On some problems it is impossible to obtain sufficient data to make much headway. Cases of tendering, stains and other defects often fall into this class, where the more obvious causes are eliminated by actual tests. In other cases the client may be unable or unwilling to present all the facts of the case. In some cases a mill inspection previous to or following the tests or analysis made in the laboratory, is essential to the rendering of an intelligent report. It is very seldom, however, that a textile manufacturer is willing to go into a matter so thoroughly. On the other hand, he expects a great deal from a consulting laboratory on the basis of a few samples, and some meager and possibly biased information. This leads to the thought that the speaker desires to leave with you to-night and that is: a greater spirit of cooperation between the textile industry and the chemist must precede any marked advance in the utilization of chemistry in this industry.

MARCH MEETING OF THE RHODE ISLAND SECTION

The March meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held at the Jesse Metcalf Chemical Laboratory, Providence, on Friday evening, March 11, 1927, at 8.15 p. m.

Chairman Hutton presided. Forty-five members were present.

After calling the meeting to order, the speaker of the evening, Prof. E. K. Strachan, of Brown University, was introduced. The subject of his address was "Some Colloid Properties of Textile Fibers." Samples and blackboard data illustrated the lecture, which was of great interest to those present.

At the conclusion of the address a rising vote of thanks was tendered to the speaker of the evening. A period of discussion followed, which lasted until the meeting was adjourned at 9.50 p. m.

A. N. Dana, *Secretary.*

Applicants for Membership

Active Membership

Beecher, Fred E., demonstrator and salesman, National Aniline & Chemical Company, Chicago, Ill. Sponsors: E. Weber and T. F. Murphy.

Daley, Edmund C., textile printer and colorist, Ciba Company, Inc., New York, N. Y. Sponsors: R. F. Culver and W. E. Mitchell.

Guerin, Julien J., president and manager, Florence Dye Works, Woonsocket, R. I. Sponsors: F. Mason and A. N. Dana.

Hyde, James, demonstrator and salesman, National Aniline & Chemical Company, Chicago, Ill. Sponsors: E. Weber and T. F. Murphy.

Johnson, P. R., chemist, Southern Franklin Process Company, Greenville, S. C. Sponsors: B. S. Phetteplace and Charles H. Stone.

MacIntyre, G. Gaynor, textile chemist, Lancaster Mills, Clinton, Mass. Sponsors: J. F. MacIntyre and H. F. Finlay.

Peinert, Emet A., assistant dyer, Lancaster Mills, Clinton, Mass. Sponsors: J. F. MacIntyre and H. F. Finlay.

Puckett, W. W., Southern Franklin Process Company, Greenville, S. C. Sponsors: B. S. Phetteplace and Charles H. Stone.

Scheren, Arthur L., foreman dyer, Miesch Manufacturing Company, Paterson, N. J. Sponsors: Joseph Colman and J. J. Sokolinski.

Spuhler, William H., chemist, Ultra Chemical Works, Paterson, N. J. Sponsors: J. S. Lange and D. P. Knowland.

Stuart, George, assistant chemist, Assabet Mills, American Woolen Company, Maynard, Mass. Sponsors: H. Christison and C. Monroe.

Junior Membership

Hamilton, Gilbert, assistant top dyer, Guerin Mills, Inc., Woonsocket, R. I. Sponsors: J. G. Masson and Robert V. Kelley.

Haynes, A. K., student, Lowell Textile School, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

Johnson, Earle K., laboratory assistant, Franklin Process Company, Providence, R. I. Sponsors: H. G. MacDonald and A. N. Dana.

Johnstone, Edwin P., student, Lowell Textile School, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

Lewis, Donald R., chemist, Lowell Bleachery, Lowell, Mass. Sponsors: A. K. Johnson and F. C. Hewitt.

McGibbon, James, student, Lowell Textile School, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

Rodalvicz, Francis R., student, Lowell Textile School, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

WALTER E. HADLEY,
5 Mountain Avenue,
Maplewood, N. J.

The Dyer's School of Experience

[Editor's Note.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* Reporter *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* American Dyestuff Reporter, *90 William Street, New York City.*]

ADVENTURES IN BLEACHING

By Noel D. White
Davenport Hosiery Mills, Chattanooga, Tenn.

MY first knowledge in bleaching was acquired during the time I was apprentice in a dyehouse where all kinds of fibers were taken in to dye for various trades: silk for weaving, sewing, embroidery and the like, cotton, wool, jute, etc. We bleached here in several ways according to the kind of fibers to be treated. The cotton we bleached with calcium chloride and carbonate of soda; the wool and silk with sulphur dioxide in the sulphur chamber. I was at this time in the department of whites and light colors, and here we also prepared all the work for the other departments. That is, we did all the boiling off of the silk for colors and blacks. We prepared the wool ready to dye, also the cotton and other fibers. We dyed or bleached, and dyed the light colors and sent to other parts of the dyehouse the lots to be dyed medium or dark shades and black. We also loaded with tin bichloride in a very primitive way in this department.

Spots on Spun Silk

In this place each dyer had his special line and naturally became proficient in it. One dyer had all the reds, another all the blues, another the browns and so forth.

This firm had a standing contract to dye the spun silk for a factory that had to supply some churches with tapestry decorations. Colors were black, olive, crimson and white, fast to light. Black was dyed in the ordinary way, with nitrate of iron, gambier and logwood. The olive was given a bottom of madder, then steeped in alum overnight and dyed with a grass extract called woad and topped in a soap bath with logwood, a process in dyeing that is long since forgotten. The crimson was also steeped in a solution of alum, then dyed with ground cochineal flies in a bath of cream of tartar, another process obsolete at this time.

The white was our work. After having washed the spun silk in boiling soap we washed it good in warm water and whizzed it ready to put in the bleach. This was prepared in two big white enameled jars, capacity about 50 gallons. Lots came in 100 pounds. We filled the jars with water about 100 deg. Fahr., then we added about 4 gallons of hydrogen peroxide and put our spun silk in it for overnight. In the morning we wrung the silk out and washed it carefully by hand in a rectangular pool made of flagstone, with three compartments. One partition 4 inches from the end side reaching to within 3 inches of the top let the water flow in the first washing basin. The other partition, about 6 feet from the first and 2 feet high, held the water for washing. A third partition was 6 feet further down and a trifle lower than the second. Water coming in from the upper end filled up the first basin and overflowed into the second basin, then went over the third partition into the sewer. We started the first washing in the lower basin and rinsed in the upper basin. This was our washing equipment for our bleaching and tin weighting.

The blacks were washed in the river from a flatboat moored to the shore. The preparation of the black bath was always presided over by the proprietor of the establishment because it was a dangerous operation—dangerous to the silk. He had learned to bleach that way in some chemical school of those days, and it was not quite what it should have been. While the bleaching itself produced in the end a satisfactory white, every time a lot was bleached there were in the yarn a number of small brown spots which invariably not only proved to be unremovable but caused the thread so spotted to break. I now believe those spots were caused by small iron particles which had come in with the water and, oxidized in the threads by the peroxide, caused the damage; but in those days we were in total darkness as to their cause.

More or less we always had them. Sometimes it was heartbreaking to see the amount of waste this caused. For a long time we worried over the matter, but we could find no remedy. One day while we were worrying over a bad lot a stranger came to the dyehouse to see the manager. When he was properly introduced he told us he came from France and had a process to bleach with hydrogen peroxide, silk, tussah, spun silk, in fact, any vegetable or animal fiber in existence better than it was ever done before. For $200 he was willing to show us how to do it. If he was a faker we would have to pay him nothing, but if he could do what he pretended to be able to do, he was surely sent to us by Providence in our hour of need.

The manager needed no urging to put him to the

task. He signed him up, took an order for what he needed and dispatched a messenger to the nearest drug house. Then he set me to prepare a lot of spun silk for the test. The stranger took charge and I was elected his assistant.

The Miracle Man

He commandeered a new wooden vat we had, 2 feet wide, 3 feet deep and 8 feet long, lined inside with canvas. He fitted it with a closed lead pipe, coiled all around the bottom for steam. The vat prepared, he filled it with water, had me cut in a bar of olive oil soap, added 10 pounds of silicate and raised it to the boil.

Then he started to pour in 4 gallons of hydrogen peroxide. At this point the boss threw up his hands and cried that he was going to ruin his silk. He had been instructed that the temperature of the bleach should never exceed 100 deg. Fahr., but the stranger exerted him not to be alarmed, that he knew what he was doing and was going to deliver the goods. The manager left then, but told me to watch closely, for it would be my job to do it in the future.

The silk, in the meantime, had been prepared as before, and he made me put it back on sticks, and when entered in the bath we kept turning it for two hours. At the end of that time a couple of skeins were taken out, rinsed in warm water, dried and brought to the boss for inspection.

Naturally the boss was more concerned about the strength of the silk than the color, but finding it unimpaired he proceeded to match it and the result was greatly gratifying.

That first trial having been proven successful we next took a lot of tussah, a fiber very hard to bleach properly, and the results, while not as good as it is done at present, was much better than we had ever been able to do up to that time. But what was to be considered was the certainty that we had done away with the brown burning spots. We never saw them any more, and no tears were shed over their passing.

This was in the year A. D. 1890, and to-day the process has changed but very little. Of course, when bleaching I kept strictly to instructions, making sure everything was exactly as it was shown me, and wherever I went it was my business to see that I had a wood or lead lined vat and a lead coil steam pipe.

Then one day, while working in a dyehouse in New Jersey, I was horrified to see that they had installed a line of bleaching tubs fitted with goose neck brass steam pipes. As I was there to work and not to find fault with the equipment, I kept my counsel and watched, but nothing wrong came from that arrangement.

But that was the first jolt to my firm belief in my early teachings. There were more to come. Later on I got a job in a place where there was a great deal of bleaching to be done on yarn.

They put the washed and whizzed silk on ropes, ten or twelve handsful to a rope, and the whole laid in the bleach bath. Some planks were placed on top to keep the goods under the liquor overnight. In the morning it was a mess to take the goods out. The skeins had to be taken a few at a time, wrung and put on sticks to be washed and finished. I found the bleach did not always come out even, and a lot of times was wasted. I thought I could improve that. After the yarn to be bleached was washed I let them drain good, then moved them to the bleach vat and set them in the bath without whizzing them. We turned them three times in the bath, then pushed the goods, stick and all, on a slant in the bath and the planks on top to keep them under. In the morning it was only a matter of a few minutes to remove them and bring the lots in the washing vats with quicker and better results. My helpers were delighted over the new arrangement.

A Plumbing Job

About a week after I had started doing that work I found a leak in the joint where the lead pipe was joined and soldered to the iron steam pipe. The bleach bath was heated with the regulation lead pipe coil, the same as I had been instructed that it had to be when bleaching with peroxide of hydrogen. I reported the leak to the superintendent and that gentleman started to curse the plumbing trade in general, saying there was not a plumber in town who could fix that joint, and that every time it started to leak they had to send for a man from out of town, and that every two or three weeks it broke, and asked could I not devise a better arrangement? I could. Remembering the brass steam goose necks in the New Jersey dyehouse, I told him if he would send me the mill plumber I could instruct him how to fix my steam pipe for that vat permanently. I figured that if that brass pipe never caused any trouble in the bleach in New Jersey, there was no reason why it should cause any trouble in my bleach here.

When the plumber arrived I had him remove the lead coil. Then I had him cut a piece of brass pipe 1 inch in diameter into three pieces: One, 2 feet long, to extend into the vat; one to drop to the bottom, and a third, 3 feet long, perforated on both sides for the whole length, we attached to the drop piece, parallel with the bottom. In about two hours the pipe was ready in the shape of a Z and we attached it to the valve by means of a coupling. We raised the heat of our bath to 140 deg. Fahr., then uncoupled the pipe and removed it, added the peroxide of hydrogen, stirred the bath and put our goods in.

This was intended only as a make-shift until we

could order a goose neck, but we found it was so easy to attach and remove our home-made steam pipe that we never changed while I was there, and I never had any trouble with it.

The Second Jolt

Some years ago I went to a job where there was a lot of white goods to be dyed. I found in that place they had a sulphur house, but when I saw the kind of work they had for me to do I decided that there was no need for it. They had goods woven with white Japan silk and my boil-off with a little blueing was all that was necessary. After a few trials the manager was convinced that we did not need a sulphur house, so I dismantled and used the room for a storage place. The manager was delighted to do away with it because he said that every time they opened that sulphur house the whole mill had the benefit of the sulphur dioxide which permeated the surrounding atmosphere to the discomfort of all the employees.

For over a year we went along nicely. Then the firm decided to enlarge the business and took in partnership a French firm who had imported goods like we made at that time and desired to start manufacturing here.

In due time a party of Frenchmen came over—the boss, a finisher who was to superintend the works and a dyer, I supposed, to take my place. The boss was the only one who could speak a little English. When I was introduced I asked him where I stood with my job. Glad to talk in his own language again—for I was the only one in the mill and in the whole town who could talk French at that time—he assured me that I was needed here and would not need to look for another job as long as I lived. How he could lie! He had me fired after three months. But this is going ahead of the story.

After they got settled I was to dye the skein work and he took the goods in the piece. When he started his first boil-off I got my jolt number two. I had been trained to use only pure olive oil soap, with special stress on avoiding soda in any form in the boiling-off baths.

You can imagine my horror when I saw this new dyer take a big dipper full of soda ash and start his bath with it. As I had been told not to interfere with anything he did I said nothing and just watched. Again I was disappointed when no trouble came of his recklessness. When I saw him doing it regularly I became convinced that I still had lots to learn.

One day the old superintendent came to tell me that the French dyer had received a lot of chemicals and had them stored in his room, with orders to let nobody enter that sanctuary. He told me they were going to do some bleaching and some loading very soon, and would enlarge the dyehouse at once. That was good news, but why the secrecy about the chemicals? He did not know but if I wished to see what they were, he would open the room for me and let me investigate. So that noon, while the man went out for lunch, I was introduced to my old friends, the hydrogen peroxide, the silicate of soda, the bichloride of tin and the phosphate of soda. This latter, through a mistake in translation, instead of being the industrial kind to use in the dyehouse, was a fertilizer and we sure had a good laugh over it.

Evidently these men had come to believe that we in this country knew very little about dyeing, and they were not going to show me anything if they could help it.

Unfair Tactics

Up to this time, when I was the only dyer here, they had given me only white silk to dye in white. Now about a month after the coming of the Frenchmen I was given a piece of goods woven with yellow silk with instructions to dye it white. I brought the piece to the boss, and told him I was to dye the skein works only and asked what this meant. He said it did not mean anything: they simply wanted me to dye it white. "Why," I said, "I would have to bleach this piece in order to make a good white out of it. I have nothing to bleach with, unless I ask the other dyer to let me have some of his bleaching chemicals which I know he has in his room."

But he told me I should ask nothing of him, do the best I knew and make as good a white as I could without bleaching. He wanted to see the results. This was my old boss, but I could feel that he acted under instructions from the new partner. I felt that there was something queer about the business, but never dreamed it was a scheme of the Frenchman's to make me work my own undoing.

I could have gone to town and bought enough hydrogen peroxide and silicate at any drug store, or I could have refused to dye it and the other man would have had to do it, as it was his work anyway, but I went to work and did what I could and thought no more about it.

When the other dyer was ready in the new extension he started to work. He had a brick vat erected, lined with concrete, in which to do his bleaching, but did his bleaching exactly as I knew it, and when he finished his first lot I presume they compared it with my poor piece I had dyed some time before and concluded he was the best man.

Exactly three months after those Frenchmen arrived and three weeks after the boss had returned to his country, a letter came to the mill.

The old boss called me in his office and told me the content of that letter was that for the time being one dyer only was needed in the mill, and as they had paid the passage and advanced money to the French

dyer, he was the man to take charge of the dyehouse and I was no longer needed. However, he would pay me until the end of the year and I could leave when I was ready. I left that noon.

The fact that the Frenchman had broken his promise to me left be broken-hearted. I decided I never would work for a Frenchman any more as long as I lived, and I have kept my word.

I went home, made an inventory of what I had, deposited a sum in a bank for my eventual return, and went to Europe for an extended and well-earned vacation.

PAPERS OF THE DYE DIVISION

(*Continued from page* 212)

obtained by first preparing Toluylene Blue from nitrosodimethylaniline and m-toluylene diamine, then oxidizing the Toluylene Blue with atmospheric air and converting the Neutral Red chloride into the iodide and crystallizing from 95 per cent ethanol.

The Effect of Antimony on Color of Dyes. Fitzgerald Dunning and E. Emmet Reid.—In order to ascertain the effect of the stibinic acid group on the color of dyes, stibanilic acid—$NH_2.C_6H_4.SbO_3H_2$—the analogue of sulphanilic acid has been diazotized and coupled with the following intermediates: Ortho chlor, nitro, amino, methyl phenols, salicylic acid, dimethyl and diethyl aniline, J-acid, R-salt, G-salt, N and W acid, H-acid, Armstrong's acid, Epsilon acid, Schaeffer's salt, chromotrope, have been used. Woolen skeins have been dyed with these dyes and their color compared with analogous dyes derived from sulphanilic acid. The effect of the antimony has been to deepen the color of the dye in almost every case. Cotton skeins have also been made by direct application of the antimony dyes. The dyes made from sulphanilic acid are for the most part unsuitable for dyeing cotton.

Indophenols. A Study of Reaction Velocities. H. D. Gibbs.—The test for phenol, depending upon indophenol formation by the reaction between quinonechloroimides and phenol, has been developed to a delicacy of about 1 part in 20 million. A study of the mechanism of the reaction has revealed that the speed of indophenol formation is proportional to the concentration of the sodium phenolate. When the test is carried on in buffered solutions, the reaction is pseudomonomolecular. Accurate quantitative measurements have been made by means of the spectrophotometer at phenol concentrations of 1 part in 100,000, and some fair results have been obtained in concentrations so low as 1 part in 2,000,000.

The constant is expressed by the equation:

$$k = \frac{1}{tc} \ln \frac{a}{a-x}$$

where t is the time in minutes, c = the concentration of sodium phenolate at the pH of the buffered solution, a = the concentration of the quinonechloroimide, and a — x = the amount transformed in time t.

Researches on Thiazoles. XII. The Synthesis of New Isomers of Dehydrothio-p-Toluidine and of Some Related Compounds. The Connection Between Chemical Constitution and Tinctorial Properties in the Thioflavine and Chloramineyellow Groups. Marston Taylor Bogert and Roger William Allen.

Five new isomers of dehydrothio-p-toluidine, carrying their methyl and amino groups in other positions, have been synthesized and studied. From these new bases, new thioflavines have been prepared, analogous to thioflavine (Colour Index No. 815), but with their nuclear methyl and amino groups in different positions, and the effect of these changes upon tinctorial properties has been noted.

From the 2-(*p*-aminophenyl)-7-methyl-benzothiazole, by the usual sulphonation and hypochlorite oxidation, an isomer of Chloramine Yellow (Colour Index No. 814) has been obtained, which is scarcely distinguished from it in physical, chemical or tinctorial properties. In the course of the investigation, the following other new compounds were prepared and examined: 2-nitro- and 2-amino-6-methylphenyl disulphide, 2-amino-4- and 6-methylphenyl mercaptans (zinc salts), 3-nitro-2-thiocyano- and 2-nitro-3-thiocyano-toluenes, 2-(*o*-, *m*- and *p*-nitrophenyl)-5 and 7-methyl-benzothiazoles, 2-(*p*-hydroxyphenyl)-5- and 7-methyl-benzothiazoles.

Dyestuffs as Medical Agents. R. W. French.—Synthetic dyestuffs for many years have played an important role in medicine as diagnostic aids, while more recently certain colors have displayed promise as therapeutic agents. The study of body fluids, tissues and bacteria is only possible, in most instances, through the practical application of coal-tar dyes. This science has developed more or less parallel with the development of the synthetic dye production with the exception that the microscopist has in general lagged behind the synthetic chemist. To-day the majority of micsoscopical stains are accomplished with the earlier known dyes. For instance, Methylene Blue, eosin, hematoxylin, safranin, fuchsine and crystal violet remain as fundamental scientific dyes. Dyestuffs also have found application as germicidal agents. The more commonly known examples of this group are neutral acriflavine and gential (crystal) violet. Mercurochrome is a dye (dibromfluoreecein) with mercury added.

Reactions of Basic Dyes and Cyclic Derivatives of an Acid Character. Walter C. Holmes and Raymond M. Hann.—The reaction of basic dyes with acid cyclic derivatives may result in the formation of organic salts of the dyes or in that of addition products of the normal dye salts. In some instances both metathesis and addition occur. The typical reaction products of basic dyes and phenols are addition products in which

as many molecules of the phenol are retained as there are "unsaturated" amino nuclei in the dye. These phenolic addition products are useful biological stains and are expected to prove valuable bacteriocidal and therapeutic agents.

Reversible Oxidation-Reduction in Dye Systems. Wm. Mansfield Clark.—In a limited number of cases equilibria in reversible oxidation-reduction systems can be measured potentiometrically. This is true both for inorganic and organic systems. Certain dyes are particularly well adapted to this type of measurement. A considerable number has now been studied. The data reveal primarily the relative values of the intensity factor in the energy of reduction by some standard system such as hydrogen-hydrogen ion. However, there are also revealed the values for the energy of ionization of various groups in the oxidant or the reductant of a given system. Such data quite definitely characterize a given system and have various uses which will be mentioned. A thorough understanding of reversible systems is prerequisite to further investigation of irreversible systems. The connecting link will be shown.

The Application of Vat Dyestuffs in the Package Type Machine. T. R. Johnson.—The winding of packages, wetting out. The selection of dyestuffs, pastes and powders, for light or heavy, self or combination shades. Reduction and dyeing of vat dyestuffs, temperatures, assistants, timing and direction of liquor flow, additions. Finishing operations.

Effect of Hydrogen-ion Concentration on the Dyeing of Wool. M. L. Griffin, N. O. Howard and E. K. Strachen.

The Application of Sulphur Colors to Raw Cotton. H. M. Chase.—Description and general characteristics of sulphur colors and their solutions. Characteristics and special qualifications of the dyeing on cotton. Preliminary laboratory tests essential for intelligent application. Mechanical methods. The actual procedure of dyeing, drying and conditioning.

A Critical Study of the Accuracy of Dye Testing Vat Dyestuffs for Strength. Carl Z. Draves. A critical study based on the results of several hundred dyeings and observations by six different textile colorists has been made of the accuracy with which the dyeing strengths of four representative anthraquinone vat dyestuffs can be tested for strength by the usual routine laboratory dyeing method. For these colors it was found that the average deviation between successive separate determinations of dyeing strength calculated from any one expert's judgments made on dyed skeins bearing only code numbers to eliminate any possible bias was about 2 parts in 100. For samples differing markedly in hue from standard the value for the dyeing strength of a sample obtained by averaging the results of one dyetester's estimates as to dyeing strengths based on his observations of twelve separate dyeings, each with its separate set of standards, differed in some instances by as much as 7 per cent from the average value for the same skeins obtained from the observations of another man.

Dyeing with Sulphur Colors on Celanese Mixtures. Harry Price.—Until recently it has not been considered feasible to dye with sulphur colors in the presence of Celanese. In this paper a process is recommended which is very simple and without danger of the Celanese.

Fur Dyeing: The Role of Chemistry in the Fur Industry. William E. Austin.—One of the chief factors in the development of the fur industry in this country during the past decade is the progress made by the fur dyeing branch of the trade. This is due to the application of modern chemical science and technology in the treatment of furs. In spite of the great variety of furs, and the difficulties involved in the dyeing operations, it is now possible to produce on furs effects such as could be made formerly on textile fabrics only, as printing, etching, stencil work, multi-colored effects, etc. Bleaching has been successfully developed and applied. Naturally dark furs can now be dyed in light colors similar to those hitherto obtainable only on white furs. The leopard has been made to "change its spots." In the very near future black furs will be made white on a commercial scale. Vast possibilities are open for the development of fur dyeing. Little has been done as yet scientifically.

Basic and Acid Dyes with Silk. Wilder D. Bancroft and R. C. Houck.—Silk is said to behave differently from wool with basic dyes, sodium sulphate forcing the basic dyes on wool and acting as a restrainer in the case of silk. This difference is not a real one; but is due to the practice of adding fast soap when dyeing silk.

The Theory of Dyeing. Wilder D. Brancroft.—If one plots concentration in the dye bath against amount of dye absorbed by the fiber, one always gets a smooth curve and consequently there is no formation of a definite chemical compound between the dye and the fiber or between the dye and the mordant. We are dealing throughout with adsorption. The basic and acid dyes are in true solution and their adsorption varies with the adsorption of the various ions in the solution. Most of the other dyes are in colloidal solution and their adsorption varies with the stability of the colloidal solution. The effect of electrolytes is therefore fundamentally different in the two cases.

The Columbia Piece Dye Works, Inc., of Paterson, N. J., have awarded a general contract to N. Merengoff, 83 Fair Street, for a new one-story mill building, 80 x 100 feet, reported to cost about $32,000 with equipment. J. C. Van Vlandren, Paterson, is architect.

AMERICAN
DYESTUFF REPORTER
Sample Swatch Quarterly

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
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UNPROGRESSIVE MODERNS

MILLS are studying more than ever how to modernize their methods. In their dyehouse and bleachery they employ technically trained men who can install the latest processes and, with their knowledge of dyes and chemicals, reduce production costs. But in their haste to keep abreast of changing styles and newer methods many mills give too much attention to trifling details of operation and overlook conditions in their plant that mark them as unprogressive. An alert eye is kept on employees' time and on shifting prices of materials and supplies, while somewhere in the mill, out of sight and working quietly, waste is lying in wait for part of the profits.

Somewhere, perhaps in the dyehouse or in the finishing room, an old rattling machine is keeping down the production record of that department, adding daily to its running expense. In the laboratory the chemist figures, with the nicest precision, the 98-cent difference between two lots of soda ash; but later, when an antiquated extractor breaks down, who reckons the dollars of time lost in waiting for repairs? Even when a batch of silk is stained with oil or rust, or torn on a cracked roller, no account is taken of the ultimate cost of the damage. The oil continues to drip; the roller remains rusty and worn; for the work must go on. But under what costly handicaps!

The management of men in the mill may be in accord with the latest theories; the processes may be of the newest, most efficient type; in the dyehouse the season's latest shades may be run. But if the equipment is antiquated, where go the savings from all this efficiency? Mills that take pride in well-trained help and up-to-the-minute management should not let their new methods laugh at their old machinery.

REVERSING AN OLD TALE

AMONG the stories read to most of us in childhood was the pretty tale of the ugly duckling that grew up to be a great white swan. The story has become almost allegorical, because we often see its counterpart in daily life when something extremely unpromising suddenly turns out to be an object of admiration.

The tale is sometimes reversed, however. There is in the textile industry to-day a condition that might be compared to the changing of a swan to an ugly duckling.

When rayon enters the mill in skein form it is a beautiful material which is later woven with other fibers into fabrics of wide utility and matchless charm. But—and this is the all-important fact—a truly perfect fabric results only if samples of rayon are chemically tested to determine their various dyeing properties *before a single lot of any kind is ordered.* The dyer or the chemist should make this test, and a laboratory report should be submitted whenever rayon is selected. Only in this way can mixed lots be kept out of the weave room.

If rayon is purchased on the basis of price or on the basis of mere appearance and "feel," the mill is buying a swan that may turn out to be a very ugly duckling indeed when it comes from the dye bath.

EXPANDING OUR FOREIGN DYESTUFF TRADE

ALTHOUGH some European countries boast of chemical plants of tremendous capacity, it is significant that European consumers of dyes and chemicals do not shop exclusively at home. American coal-tar products have been finding profitable markets in Europe and the Far East and to some extent have broken through heavy foreign competition. Our trade in these products has been made up principally of certain bulk colors, benzol and other crudes.

During the first nine months of 1926 the total quantity of American colors, dyes and stains shipped abroad was well over 18,800,000 pounds, valued roundly at $4,300,000. It seems that in Europe, as well as here, the word "imported" on goods is the *open sesame* to many markets. Even in Germany, where the chemical cartels form the backbone of the nation's industrial strength, American chemical specialities are popular, frequently outselling the German products, thanks to liberal advertising in European papers.

We may credit a fair portion of our overseas trade in chemicals to the world-wide activities of the Bureau of Foreign and Domestic Commerce, an enterprising unit of Secretary Hoover's department One of the main functions of the Department of Commerce, in fact, is the promotion of foreign trade, and it has been doing its work well. It specializes in

unearthing new markets for the innumerable products of American factories and in furnishing to the trades valuable data about these markets.

Under the prevailing policy of strict economy in Government operation, there has been until lately some danger of a sudden check being put upon this Bureau's foreign trade work. The Foreign Service of the department has been maintained on a temporary basis, and annually renewed. But in the session of Congress just closed, a measure was passed that provides for continuous foreign commerce service on a permanent foundation. The service, in short, has now become one of the regular duties of the Department of Commerce, and as such may be steadily expanded.

When the foreign service bill came before Congress it was heartily supported by the Chemical Advisory Committee, composed of executives in the industry, and by the Synthetic Organic Chemical Manufacturers' Association on behalf of the dye industry. These bodies naturally felt elated when the measure was passed, and were pleased to receive from the Department of Commerce a grateful testimonial of appreciation for their assistance.

CHARLES E. MULLIN OPENS PHILADELPHIA LABORATORY

Charles E. Mullin, already known to most of our readers as a frequent contributor to the REPORTER, moved his headquarters on April 1 from Camden, N. J., to 3820 Sansom Street, Philadelphia. In the future he will devote his entire time to chemical consulting, research and development work, specializing in the chemistry of textiles, dyestuffs and their application, detergents and related subjects. His work will take him particularly into the interesting fields of acetate silk and wool.

Most of our readers are familiar with the series of papers on "Dyeing Acetate Silk," by Mr. Mullin, which were published in the REPORTER during 1925 and 1926. Recently he has completed a book of some 450 pages entitled "Acetate Silk and Its Dyes."

Running currently in the REPORTER is a series of papers by this author on "Wool." Owing to close connection with the wool industry during the past ten years, he has concentrated much study on this subject, which has neen supplemented by his consulting work on the various phases of wool manufacture, more particularly in the wet processes Further exceptionally interesting papers by Mr. Mullin on wool and certain other subjects will appear in the REPORTER during the next few months.

The Jenks Mill in Cheshire, Mass., owned by Cornelius Wylde, of North Adams, is undergoing repairs, including the laying of new floors and removal of some machinery. It is reported that a print works will be operated there. Mr. Wylde is chief designer of the Windsor Print Works at North Adams.

JOSEPH BANCROFT & CO. APPOINTS NEW MANAGER

Leonard S. Little, formerly general superintendent of the Lyman Department of Pacific Mills, Lyman, S. C., has been appointed works manager of Joseph Bancroft & Sons Company, Wilmington, Del. The Bancroft company has also appointed Dr. Donald S. Ashbrook as director of research.

Prior to going to Lyman, Mr. Little was for many years associated with the Pacific Mills in New England, and is prominently known in the industry. He will join the Bancroft organization April 4, and will have charge of manufacturing.

Dr. Ashbrook has been associated with Joseph Bancroft & Sons Company for many years, formerly as head chemist and more recently in an executive position on the production end. He will be relieved of the latter phase in order that he may devote all his time to the important work of research development along the lines of perfecting existing finishes and developing new ones. He will have under his direction a corps of research chemists.

NEW DU PONT RED FOR CARPET YARNS

The dyestuffs department of E. I. du Pont de Nemours & Co. is placing on the market a new acid red, Pontacyl Red 4R, which is particularly suitable for the carpet trade. Because of its very high concentration, it is claimed, in addition to excellent fastness, it will be most interesting for printing carpet yarn. However, it is also suitable for dyeing yarn or ladies' dress goods in the piece.

It dyes vivid shades of red on wool. Its solubility is such that it is suitable for machine dyeing. It can be used in combination with other acid colors, according to its description, as it dyes quite evenly.

Pontacyl Red 4R is further described as being very fast to acids and rubbing and to light, ranking with the better acid reds in this respect. Good resistance to water, steaming, ammonia, ironing and perspiration is also claimed for it. It leaves Celanese, rayon and cotton unstained. It can be used for both dyeing and printing silk, and discharged to a clear white with Sulfoxite C.

SAGAMORE COLOR & CHEMICAL COMPANY FORMED

H. P. Selya, well known in the dyestuff trade of New England in his connection with F. E. Atteaux & Co., of Boston, and a former business associate, Adolf Walz, have organized the Sagamore Color & Chemical Company, with quarters at 172 Purchase Street, Boston. Temporarily the new firm will use the facilities of the laboratory maintained at this address by F. E. Atteaux & Co.

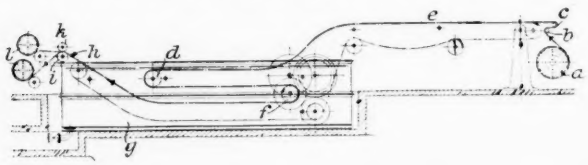
Technical Notes from Foreign Sources

Discharge Effect on Textiles Containing Acetate Rayon

Clear white and color discharge effects on cellulose acetate silk which has been dyed with those dyestuffs commonly employed for this purpose are obtained in the usual manner by means of reducing agents. These agents contain sodium formaldehyde-sulphoxylate, provided that thiocyanates such as calcium, barium and aluminum thiocyanate are present. A satisfactory discharge paste contains 15 grams of formosul (sodium formaldehyde-sulphoxylate), 70 grams of 3 per cent gum tragacanth solution and 10 grams of a solution of calcium thiocyanate (density 1.44). (British Patent No. 262,254.)

Mercerizing Fabrics

The apparatus which is shown in the accompanying illustration and which is patented in British Patent No. 247,909, is of a type that treats laterally stretched travel-



ing materials with liquids. For the removal of the lye during the mercerizing process, the fabric is taken from a drum *a*, passed over guiding rollers *b* and *c*, and is laterally stretched during its travel through the horizontal rune, at which part of its course the material can be inspected. It then enters a hot water washing tank *g*, which is placed at a lower level and in which it makes a number of superposed passes as by rollers *d*, *f* and is finally carried to squeezing rollers *k*, *i*, in front of which may be arranged a spraying apparatus *h*. On leaving the washing apparatus, the fabric is collected on one or other of the drums *l* or is immediately treated in an acid apparatus.

Mothproofing Compositions for Woolen Fabrics

British Patent No. 236,218 is concerned with a process for making a mothproofing composition and using it for the mothproofing of wool and woolen materials. These woolen materials are treated with a solution which contains a toxic substance and substances which promote rapid and thorough penetration of the materials by the solution. Caprylic acid and higher aliphatic acids and their salts are satisfactory wetting-out agents, and are used together with a protective colloid such as gelatine. The presence of a free organic acid, for example citric acid, improves the wetting-out power of the composition and the permanence of the proofing treatment.

Effect of Humidity on Cotton Yarn

Various yarns of a wide range of quality were tested at various states of wetness from dryness to saturation. The data that was collected in this experiment showed that excessive tension pulls some of the hairs loose in the case of unsized yarns of medium twist, when tested under normal humidity conditions. The rest of the hairs are broken when the yarn breaks. As the humidity increases, it was found that more hairs were effectively gripped. Examination of the break in the hairs of a moist and a dry yarn showed that in the former case the break was more of a snap, while in the latter it is more of a pull-out.

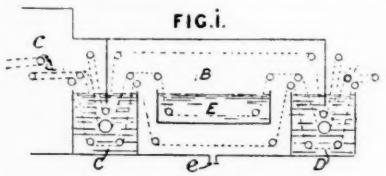
It was further found that the effect of humidity is to increase the tensile strength of the cotton to a certain extent, but it is nevertheless only large enough to account for a certain part of the change in the mechanical strength of the yarn. This is further increased by the more effective gripping of the hairs as they swell and soften. When the grip becomes complete, the breaking load reaches its maximum point, and the break becomes almost a pure snap. This is the condition in a sized yarn at all humidities. The strength is then practically the same as that of a wet-sized yarn.

The elastic behavior of sized yarn is apparently determined by that of the cotton hairs which is modified by the behavior of starch. In unsized yarns the hairs extend less at lower humidities but slip more under a given tension, the two effects roughly compensating. There is no significant difference between the wet yarns, sized or unsized, in breaking load, extensibility, or work of rupture. (Shirley Inst. Mem., 1926, Vol. 5, pp. 239-254, through Jor. Soc. Dyers Color.)

Removing Volatile Solvents

Textile materials after treatment with volatile solvents for extraction of grease are treated to separate residual solvent by passage through a chamber B which has the water seals C, D at the inlet and the outlet. The treated

FIG. 1.



material is fed from a band C between two endless perforated bands, and is carried through the water seal C, through a vessel E in the chamber B which contains water heated up to a temperature of approximately 50 deg. Cent. From the chamber B it passes through a water seal D. Vapors pass from an opening *e* to a condenser. The material may be treated on the chamber B with steam

under reduced pressure, the inner legs of the water seal being extended to form water columns. (British Patent No. 247,997.)

Katanol W in Half-Wool Dyeing

It often happens in the dyeing of half-woolen fabrics that the cotton portion of the fabric is dyed in lighter shade than the woolen portion. Such textiles are immediately recognizable as half-woolen goods. In order to avoid such irregular dyeing, the dyer has employed substantive colors in a cooled bath, but this does not appear to help the matter very much, for the dyestuff is also absorbed by the woolen portion of the fabric, and this is dyed in darker shade, which makes it still more difficult to dye the textile according to sample.

The product Katanol W possesses the property of reserving wool and silk, which means making them resistant to the dyeing properties of certain dyestuffs. Thus, when dyeing the cotton portion of the fabric with cotton colors, the addition of 3 per cent of Katanol W prevents the absorption of the dye on the wool portion of the fabric in such a manner that the color tone of the wool remains the same as in the original. When this process is being used, the temperature of the liquor must not be considerably reduced.

As important as are the advantages of the single-bath process of dyeing, so are the disadvantages. In dyeing with neutral Glauber salt liquors, the finer grades of wool are easily injured and certain textiles will be unfavorably affected as far as luster and handle are concerned. The two-bath process is, therefore, preferred in many cases. The woolen portion of the fabric is dyed to sample in an acid liquor containing the required proportion of dyestuff. Then the fabric is washed and the cotton portion is dyed with the proper color in a liquor maintained at a temperature of 50 to 60 deg. Cent., this liquor also containing 20 per cent of crystallized Glauber salt and 3 per cent of Katanol W. The shade of the woolen portion of the fabric is not touched. It is not necessary to add soda to the dye liquor containing the cotton dyestuffs, for the reason that the presence of small amounts of organic acids, such as formic and acetic acids, does not matter after the acid dyeing.

Katanol W has also been used in the dyeing of fabrics, which are made of wool and shoddy. It is known in dyeing such fabrics that the shoddy part is often dyed a deeper shade than the rest of the fabric, and it is therefore difficult to obtain good dyeings with such colors as brilliant navy blues, and the like. In the new process the shoddy is first dyed with colors that gives as bright shades as possible, for example such colors as Patent Blue, Alkali Fast Green, Acid Violet 4B extra, and the like, in acid liquors; then the fabric is washed and the dyeing is continued with the aid of cotton dyestuffs in liquors containing Glauber salt and 3 per cent of Katanol W at a temperature of 50 to 60 deg. Cent. Bright colored or black cotton dyestuffs can be used for this purpose according to the depth of the desired shade. It is also possible to obtain just as bright shades in the case of the dark dyed shoddy as was formerly possible only after stripping. In the case of half-woolen lining cloths which are dyed in light shades, it is possible to dye the woolen portion accurately according to sample, and then to redye the cotton portion without there being any fear that the shade of the dyed wool will be altered.

Katanol W has also been used in obtaining two-color effects on half-woolen piece goods. In this case the dyestuffs used in the after-dyeing process must be those that possess a high affinity for the cotton fiber and have but little effect, if any, on the woolen fibers. When Katanol W is employed, the protective action that it exerts on the woolen fiber makes it possible for a greater variety of dyestuffs to be used for this purpose. (Melliand's Textilberichte, 1927, p. 47.)

Wetting Medium

Austrian Patent No. 104,111 is concerned with a wetting medium and its use in the carbonization of textiles, their dyeing in acid solutions and for other uses in acid media in the textile and leather industries. Small amounts of sulphonic acids of aromatic compounds are added to the acid liquors. These sulphonic acids are principally those of members of the naphthalene or tetrahydronaphthalene series. The wetting agents may also be used in combination with hydrocarbons, alcohols or ketones. For example, an acid liquor may be admixed with a mixture of tetrahydronaphthalene-beta-sulphonic acid sodium salt, hydrocarbons and higher molecular weight alcohols. The alkyl derivatives of the naphthalene sulphonic acids or of the tetrahydronaphthalene-sulphonic acids may also be used for this purpose. Thus, for example, sodium isopropylnaphthalene sulphonate is used for this purpose.

ROESSLER & HASSLACHER CO. HOLDS ESSAY CONTEST

A contest unusual in conception has recently been participated in by the employees of the Roessler & Hasslacher Chemical Company.

This contest was sponsored by Mrs. Elisabeth Roessler and Mrs. Elizabeth Hasslacher, the widows of the founders of the company. Their interest in the welfare of the organization and employees manifested itself in the offer of one thousand dollars in cash prizes for the winning essays on the subject of "The Roessler & Hasslacher Chemical Company's Place in Industry."

The awards were made at the company's main office on Saturday, March 19, William A. Hamann, president, officiating. The first prize winner was Carl Seiler, the company's representative at Baltimore. Milton Kutz, manager of sales, and Colby Dill, general superintendent at Perth Amboy, awarded the prizes.

Sure Shots for Salesmen

II—GETTING THE ORDER

By Stanley Schulz

IN our last lesson we told how to find and approach the customer to be. The next is getting the order. In this step as much care should be taken as would be used in coming home at 2 P. X. carrying the live turkey you won at the raffle. You are now looking your victim in what he calls his face, and you must do nothing which would cause him to spoil yours.

Most instructors burden their pupils with a mass of material which neither they nor their stupids understand. Such is not the intention of this epistle. Simplicity is our motto. We even wear white garters.

All you have to do is *talk*, and if your larynx holds out you will surely get what you are after. A good subject to start with is the weather. This we have with us always and every salesman should be a walking almanac. With a little practice you can easily find out just what kind of weather your man likes best, and then you can talk about that kind of weather safely. Something like this: "Nice day, isn't it?" "Like Hell it is." You see he likes rotten weather, so whenever you call on him cuss out the weather.

Another method of attack is to find something a man likes to annoy people with and give him a push in that direction. This is technically known as "Riding a Hobby." Of course, you may have some trouble finding out just what a man's horse is. It would not do to tell him what fine liquor there is in Utica when he lives in Boston. He may be a pillar of the church, and besides, it's an awful distance between Boston and Utica. So, the best thing is to have a formula ready. I don't mean one for making 80-year-old rye from shoddy, but a formula which will cover all well-known interesting subjects. Like this: "I went fishing last Saturday. Sunday I played eighteen holes. I think I will go hunting this fall; anyway the gin in Utica is great." See how clever that is; covers everything. He is sure to fall for one of these and will talk for an hour, and all you have to do is "Yes" and "No" him.

Let us take the subject of golf (the further the better), and suppose the prospect is filled with a desire to take a flock of balls in one hand and a bunch of money in the other and then walk five miles, at the end of which he and an old maid will be in the same class. All they have left is hope. All golf conversations start the same way. When he asks you what you go around in, your answer should be "Agony." When he asks for your score you should tell him, "Oh, about 100." To which he is sure to answer, "What, for nine holes?" At this you go into hysterics and then you have him where you want him. All you have to do is to keep talking, and when he isn't looking take the order away from him. If he hasn't any order on him, keep talking until he has. If you keep talking long enough you are sure to get an order; maybe two of them. One thing you should never do is talk about dyestuffs—you are sure to show how little you know about the subject.

Here endeth the second lesson. In the next we will discuss how to get out alive.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

CHEMIST

Has specialized thoroughly in the analysis, manufacture and application of sizings, softeners and finishing materials and general adhesives. Technical graduate; experienced, capable worker. At present employed. Seeks connection offering opportunity for advancement. Classified Box 376, American Dyestuff Reporter.

FOR SALE

A complete Dyeing and Finishing Plant located in the Central West, fully equipped with modern machinery; land and buildings suitable for expansion, equipped for the dyeing and finishing of upholstery, denims, dress goods, coatings, cloakings, etc. Classified Box 375, American Dyestuff Reporter.

CHEMICAL SALESMAN

To represent in Eastern territory a well-known concern manufacturing textile chemicals. A textile school graduate with mill training and some selling experience preferred. Reply giving full particulars to Box 378, American Dyestuff Reporter.

TEXTILE CHEMIST-DYER

Experienced textile chemist and dyer seeks change. Familiar with all classes of dyestuffs and their application. Twelve years' experience in cotton piece goods, including three years on warps and skeins. Can take full charge of dyehouse, including mercerizing and bleaching. Classified Box 379, American Dyestuff Reporter.

FIRST CLASS DYER

Fourteen years' experience in processing wool and worsted, union piece goods of all kinds, raw stock, yarns, rayon and cotton goods. Both laboratory and selling experience. Textile school graduate. Seeks satisfactory connection with dyestuff manufacturing concern or chemical house as practical demonstrating salesman. Excellent references. Classified Box 380, American Dyestuff Reporter.